

ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE.

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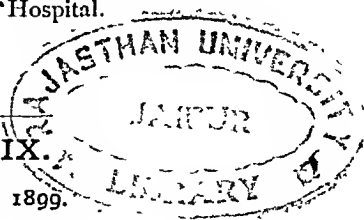
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ANNALS OF SURGERY.

THE TREATMENT OF THE INTESTINAL PARALYSIS OF PERITONITIS BY ENTEROSTOMY.¹

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IN dealing with acute cases of general peritonitis, of whatever variety, we are apt to be most gravely apprehensive of the final outcome when confronted with that condition of relaxation and distention of all the intestines which is generally spoken of as intestinal paresis or paralysis.

From the reports appearing from time to time in our medical journals, as well as from the information gathered in conversation and at medical meetings, and from personal observation, I incline to the belief that many more cases of peritonitis—be they acutely suppurative, fibrinous, sero-fibrinous, or serous in character—do actually recover in surgical practice than the consensus of opinion, as laid down in the more recent medical text-books, would lead us to believe.

Whether these recoveries, which we are all so anxious to obtain, may be traced to the kind of infection which caused them, or to certain forms of individual resistance in the patients, or to certain methods of the medicinal or surgical treatments employed, are questions now very generally

¹ Read before the New York Surgical Society, October 12, 1898.

before the profession for discussion; and, as far as the treatment is concerned, no general statement can, to my knowledge, be made at the present time as to the preference of one method above another, since the same method gives varying results in various hands and in various cases.

That in the various forms of acute peritonitis the early medicinal treatment with cathartics rather than with sedatives or opium is more conducive to a gratifying result is, I believe, generally accepted at the present time. But whether the surgical treatment of acute peritonitis should consist, in addition to the removal of the exciting cause, where this is possible, in the thorough irrigation of the abdominal cavity, or in the total evisceration and wiping off of the intestines, or in more conservative measures, as mere packing and drainage, I believe all surgeons are not agreed; and it is my personal opinion that no general rules can be laid down for the treatment of certain lines of cases, but that each case should be treated according to its own peculiar features, by methods the selection of which is a special matter of judgment for the operator.

Thus in thirteen consecutive cases of acute general peritonitis, which I recently reported to this society, in the discussion of a paper on the subject by Dr. McCosh, one recovered after irrigation of the abdominal cavity and eight without irrigation, while two died after irrigation (these, with one exception, were of appendicitic origin; the one exception being gangrene of the gall-bladder), while in one case obstruction was present, and this one ended fatally.

Since then I have made notes of ten more cases, with exactly 50 per cent. of deaths; and among these three cases presented obstruction, and ended fatally.

In none of these latter cases which recovered, as far as can be ascertained, was there extreme tympanites or distention of the abdomen, or complete obstruction,—except in the cases hereinafter mentioned,—and it is to this special symptom of peritonitis that I would invite attention in this paper.

That well-developed intestinal paralysis is of the gravest prognostic importance is generally admitted; and efforts to relieve the intestines of the large quantities of gas contained in them have long been made by various surgeons. Although realizing that the distention was not caused so much by the accumulation of gas as due to a lack of tonus in the intestinal walls, the surgeons attempted evacuation of the coils in order mechanically to facilitate their reposition and the closure of the abdominal cavity. In many works we find the employment of fine needles recommended for this purpose, and the advice given to enter these needles obliquely through the walls so as to prevent subsequent leakage, etc. But, as most of us know, these procedures are of little avail. A more thorough emptying of the intestines by larger incisions has, as far as I know, never been recommended as a systematic method of treatment, although it may have been made use of in certain single cases.

And yet the use of cathartics in peritonitis was suggested, if I do not mistake, by a desire to eliminate the masses from the intestine, which, by their stagnation and putrefaction, caused the absorption of toxins into the system, quite as much as by the desire to favor the absorption of the peritoneal exudation by what has been called "intestinal drainage."

The further development of this idea necessarily leads to the desire to still further improve drainage through the intestine by direct and continued openings into it, and a proper care that the discharges from these be carried outside of the body, where they can do no harm,—in other words, by the establishment of one or more intestinal fistulæ.

This idea first suggested itself to me in the following case, in Dr. Gerster's service, at Mount Sinai Hospital, which came under my care, during his absence, on July 9 of the present year.

CASE I.—H. Z., thirty-two years of age, was admitted July 5, 1898. He had passed through an attack beginning similarly

to this one six years ago. Present illness commenced four days before admission, with severe colic, nausea, and vomiting; no fever; bowels moved daily with aid of cathartics. Pain increased, and became more localized over the right iliac and hypogastric regions. Urination painful; vomiting continued.

On admission the abdomen was found distended, tympanitic; an ill-defined mass could be made out in the right iliac region, which was tender on pressure.

On July 7, the second day after admission, Dr. Gerster operated, making an incision over the most prominent part of the tumor four inches in length. This opened the peritoneal cavity, revealing a mass of adhesions covered by omentum. The free cavity being walled off with gauze packings, the coils of intestine were carefully separated laterally from the pelvic wall, when a deep ileo-cæcal abscess was found between two coils of intestine. A well-defined abscess, separate from the general peritoneal cavity, was also found in the hypochondriac region. The appendix was not encountered. A drainage-tube being introduced at the bottom of the abscess-cavity, packings were inserted around it, and the rest of the cavity packed with loose gauze. The intestine remained exposed in the wound and was covered by gauze compresses. One suture (silkworm gut) was introduced into the upper angle of the wound, the rest of which was left open. Dressings applied as usual.

In spite of the administration of a series of doses of calomel and salts the patient did not improve after operation, but continued to vomit a green fluid. Temperature 100.8° F. The abdomen became markedly distended and painful.

On July 9 (two days after the operation) the patient was seen by the writer; intestinal paresis was diagnosed, which was not relieved by stimulation or enemata. Accordingly, free drainage through the intestine was advised, and on the same day colotomy was performed by the house-surgeon; the presenting piece of intestine being packed around with iodoformized gauze and freely incised with scissors. But little evacuation following, a catheter was passed into the intestine and irrigation with salt solution employed, which was soon followed by a copious discharge of gas and fæcal fluid matter, which continued into the dressings, much to the relief of the patient. July 12: Three days later the patient was much improved; the abdominal distention having disappeared. Temperature and pulse normal.

On the following days the dressings were renewed as usual; the discharge through the intestinal fistula diminishing.

On July 15 the enterostomy opening was closed by Lembert sutures, while the rest of the wound was left open. The closure having proved satisfactory, and the abscess-cavity contracting to a sinus, a secondary suture was done on August 15, the skin being dissected up on either side of the wound, the fascia separated, and its edges brought together with chromicized catgut, and the skin sutured. Recovery progressed rapidly, and the patient was discharged, cured, on August 31.

In the following case the same line of treatment was pursued with a similarly gratifying result:

CASE II.—T. B., fourteen years of age, a native of the United States, was admitted May 25, 1898. Five days previously he had been seized with severe colic, and the pain continued in spite of a daily movement of the bowels. The day before admission evacuation from the bowels ceased, the abdomen became greatly distended, and vomiting of a large quantity of bilious fluid set in.

The writer operated soon after admission (Schleich's second mixture being employed as anæsthetic), making an incision through the abdominal wall and peritoneum on the right side. Through this a large quantity of thin, serous pus flowed out, being under great pressure. The appendix was found and proved gangrenous; was ligated and removed in the usual way. Examination of the abdominal cavity now revealed the presence of pus between the coils of intestine, and another incision was made opposite to the first one, on the left side of the abdomen.

The entire abdominal cavity was then irrigated with a hot, normal, saline solution, until the fluid came away clear (a Chamberlain tube being employed for this purpose). Large drainage-tubes were placed in the incisions leading to various parts of the abdominal cavity, and packings were inserted between and about them. A moist dressing of creoline solution (1 per cent.) was applied.

On the following day the patient's general condition appeared good; a slight rise of the pulse and temperature above the normal being recorded.

On the next day, however (the second after operation), the abdomen again became distended. Constant vomiting set in, and attempts to empty the rectum failed. Intestinal paresis was diagnosed, and an operation looking to the evacuation of the bowel deemed advisable. Accordingly, the ascending colon, lying in the wound on the right side, was incised, and an artificial anus established. Soon after this some gas and faecal matter were passed through the rectum.

On the 29th (four days after operation) the patient had much improved. Temperature 100° F.; pulse 96. Drainage-tube removed from the left side; change of dressings.

June 1: Patient steadily improving.

June 7: Partial closure of wound on the right side with cat-gut sutures. One deep drainage-tube still retained. Colotomy wound closing by granulation.

June 14: Smaller and shorter drainage-tube inserted. The faecal fistula spontaneously closed; wound in left almost entirely healed.

June 21: Continued improving. Through the rectum products of inflammation could be made out on the right side.

July 9: Wounds all satisfactorily healed. Patient discharged cured.

The foregoing treatment having given such satisfactory results in these cases, on being again confronted by a case of general acute peritonitis with marked intestinal paresis, where the patient's condition admitted of no delay, the writer decided to adopt a similar technique at the time of the first operation.

CASE III.—S. S., twenty-three years of age, capmaker from Russia, had had severe abdominal pain five weeks before admission, with nausea and vomiting, which passed over after evacuation of the bowels. One day before admission the same symptoms returned. One slight movement of bowels the night before admission, but not since then. The abdomen became distended.

On admission (September 27, 1898) temperature, 101.6° F.; pulse, 104; respiration, 28. The abdomen was greatly distended up to the umbilicus and very tender on pressure; no mass could be made out by palpation.

Immediately laparotomy was done by the writer, under chloroform anæsthesia, a median incision, three inches long, being made below the umbilicus. On opening the abdominal cavity much free, thin pus was found, which flowed through the wound. All the intestines were found greatly distended and congested. After sponging up much of the pus two large drainage-tubes were inserted, leading down into the pelvis, and then the abdominal cavity thoroughly irrigated with hot, normal, salt solution, a Chamberlain tube being used for this purpose, and the patient being raised to a half-sitting posture.

The region of the appendix was explored, but no lesion found there. Packings being placed along-side of the drainage-tubes, a knuckle of greatly distended small intestine, lying in the upper angle of the wound, was now stitched to the parietal peritoneum with continuous silk sutures, a light iodoformized gauze packing introduced between this and the skin, and the lower portion of the wound, with its drainage-tubes, separated from the upper portion by a rubber tissue-dam, fastened to the skin by means of chloroform. The intestine was now opened by a longitudinal incision, and a little fluid escaped.

September 28: On the following day, however, a profuse discharge of thin fæces took place, making frequent changes of dressing necessary.

September 29: Temperature in the morning, 99.8° F.; in the evening, 100°; good pulse and general condition; new packings inserted into wound.

September 30: Patient much improved. Tubes shortened.

On October 3 an attempt was made to close the intestinal fistula by sutures. This having proved futile, on October 7 another attempt was made to close the intestine, a purse-string suture being first inserted, and over this several interrupted cat-gut sutures. This being followed, however, by vomiting, the sutures were again removed.

At the date of the present writing, fifteen days after operation, the patient still continues in good general condition, with normal temperature, but with still much discharge from the fæcal fistula.

The writer is well aware that any conclusions from the final outcome of the cases narrated, as to the general efficacy

of the treatment employed, would be open to many serious objections.

It might be argued that these cases could possibly have recovered under expectant treatment after the abdominal cavity had once been drained. Again, it might be argued that the intestinal paralysis was not complete, and that time was all that was required, after the initial treatment of evacuation of the pus, to restore its natural tonus. Then the nature of the infection might be dwelt upon, as not representing the most virulent type of the disease.

(I much regret that the notes as to the bacteriological examination of the exudates in these cases are incomplete.)

The writer, however, does not wish to represent this treatment as an infallible method of successfully dealing with peritonitic intestinal paresis.

But in the face of the graver forms of peritonitis, complicated as they are with such paralysis more or less marked, we are in so helpless a condition with our present surgical means of combating them that any method of treatment which appears to favor a good result must commend itself to our special notice; and it is with the desire that this treatment of intestinal paresis, complicating the various forms of general peritonitis (by the establishment of one or more enterostomy openings, in order to more completely and rapidly drain the intestine), may receive some further study and discussion that I have ventured to report these cases.

In conclusion, I would add a few remarks suggested by the observation of the reported cases.

In many cases of peritonitis, where the abdomen has been opened for drainage, the packings or tubes employed for this purpose, and inserted between the coils of the distended intestines, may easily compress the latter, and thus directly interfere with the restoration of peristalsis and the normal evacuation of the bowels. In such a case the additional one or more openings in the intestine will act as escape-valves and prevent the threatened danger.

The openings into the large or small intestines, for this

purpose, should be made longitudinally, as intestinal fistulæ, rather than as artificial ani, in which the gut is usually cut across. This greatly facilitates their spontaneous closure. In fact, they cannot be kept long open, unless foreign bodies be present.

When the openings into the bowel are made at an early date (as in the last case reported), there is some danger of the fæcal matter being spread over the wound, and contaminating the freshly cut surfaces. But where iodoform-gauze packings are used in the cavities thus exposed, and compresses are placed on the raw surfaces, no danger from such contact exists.

And after granulation has once been established by the iodoformized gauze, no infection will take place through the presence of fæcal matter, unless these granulations be made to bleed. Moreover, these wounds are all freely open, are dressed very frequently, and the putrefying matter is not confined there under pressure.

The fistulous opening into the gut may also be used for the introduction of medicines or restoratives, provided that some intestinal function is present.

If the distention and paralysis of the bowel be not complete, it may be advisable to leave some distended intestine in the openings made at the time of the operation, or there sutured, so that at any subsequent time, if the bowels be not moved or if the symptoms of absorption continue, artificial openings may be made without further trouble.

CONTRIBUTION TO THE SURGERY OF THE KIDNEY.

A REPORT OF CASES TREATED IN THE ROOSEVELT HOSPITAL
OF NEW YORK IN THE PERIOD FROM JANUARY 1,
1890, TO OCTOBER 1, 1898.

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OPERATIVE cases are alone included in this report. A number of other cases of injuries and diseases of the kidney, which entered the hospital for treatment, but in which recovery took place without operation or in which operation seemed to be contraindicated, are omitted. The list of cases operated upon includes eighty-six patients. They may be classified as follows:

	Cases.
Injuries of the kidney	7
Movable kidney	15
Perinephric abscess	3
Abscess of the kidney, suppurative nephritis	12
Pyonephrosis	9
Pyelonephritis, double	1
Tuberculosis of the kidney	9
Nephrolithiasis	12
Dilated ureter, suppurative ureteritis	1
Stricture of the ureter	1
Intermittent hydronephrosis	1
Renal colic	2
Cystic degeneration of the kidney	7
Tumors of the kidney or of the suprarenal capsule	6
Total	<hr/> 86

A few of these cases might properly have been placed in one or other of two situations in the list, notably a case of

hydronephrosis, caused by a stone plugging the ureter in the manner of a ball-valve, and allowing urine to escape freely when it became displaced. Also several of the cases of abscess of the kidney and of pyonephrosis, which appeared to be in more or less advanced stages of the same condition, or were unrecognized cases of tuberculosis.

INJURIES.

Of the seven cases of injury to the kidney, which were operated upon, all were males, and all but two were young adults. The oldest was twenty-eight, the youngest ten years of age. The degree of external violence producing the injury was in all cases extreme, and was caused in five cases by the patient falling some distance and striking against some hard object, which injured the loin or the lateral wall of the abdomen. The sixth case was crushed between two cable-cars. In these six cases the injury was subcutaneous. In the seventh case the patient, who was riding a bicycle, collided with the shaft of a wagon, which penetrated his right pleura, diaphragm, peritoneum, liver, and caused a contused and lacerated wound of the right kidney. In Cases I, IV, V, VI, and VII the patients were brought to the hospital soon after the accident, suffering from marked shock. In Cases II and III, both subcutaneous injuries, the patients walked home, some distance, and one of them did not begin to feel ill until four hours had elapsed. In Cases I, II, III, IV, V, and VII hæmaturia was noticed immediately after the accident. In Case VI the urine, withdrawn from the bladder soon after the accident, was free from blood, hæmaturia appearing after eighteen hours. In Case IV, contusion of the kidney, hæmaturia ceased on the third day of the injury. In Case II hæmaturia persisted for twenty-eight days and was very severe. At the end of that period the kidney was removed, and was found extensively lacerated, but the capsule of the kidney was not ruptured nor the surface of the organ broken. In Case V hæmaturia existed immediately after the accident, but almost entirely ceased at the end of three days, when the

kidney was removed, and was found completely ruptured, and surrounded by much fluid blood. In Case III hæmaturia was slight, but continued until the second day after the injury, when the kidney was found extensively lacerated and surrounded by much blood. In Cases III and V, where the capsule was ruptured and much blood escaped into the surrounding tissues, the hæmaturia was less marked than in Case II, in which the capsule was untorn and the ureter the only outlet for the accumulated blood. In Cases I, III, and V a distinct tumor was present in the injured loin soon after the accident, with flatness on percussion, extending some distance forward on the abdomen, and in all these operation revealed an extensive accumulation of blood behind the peritoneum. In these three cases an operation was done not long after the accident. In Case I upon the same day, the indication being, in this case, the rapid formation of a tumor in the region of the right kidney, severe pain, and moderate shock, together with the symptoms of hæmorrhage. Lumbar extraperitoneal incision, March 30, 1893. The kidney was found enlarged, contused, lacerated, and surrounded by extravasated blood. From the interior of the organ a large mass of disorganized kidney-tissue and blood-clots were removed. The cavity in the kidney was packed, and the wound healed in an aseptic manner. The patient is in sound health now, after an interval of five years.

In Case III a large tumor formed upon the second day, in the left loin, causing flatness on percussion, as far forward as the median line in front. The symptoms of hæmorrhage were marked, there was a rise of temperature to 102° F., and the patient looked very ill. Transperitoneal nephrectomy in the left semilunar line, August 7, 1894: A large retroperitoneal hæmatoma; extensive laceration of the left kidney; aseptic healing. Patient left the hospital in two months well. He could not be found in October, 1898. In Case V a large and growing tumor existed in the loin upon the day of the accident, with flatness, extending well forward in the abdomen. The signs of hæmorrhage were marked.

A rise of temperature occurred on the third day to 104.5° , when lumbar nephrectomy was done, February 10, 1898. Large perirenal hæmatoma, a complete rupture of the kidney into two fragments, with contusion of the kidney-tissue. Aseptic healing. In sound health October, 1898.

In Case IV severe shock followed the accident. There was moderate hæmaturia, which ceased after forty-eight hours. Pain and tenderness over the right kidney, but no tumor. A daily rise of temperature occurred after the fourth day, which continued until the fourteenth day. At this time there existed pain and extreme tenderness in the region of the kidney. The patient's urine contained much pus. On this day, November 9, 1895, lumbar nephrotomy was done, and a portion of necrosed kidney-tissue was removed. Aseptic healing. The patient left the hospital well, but could not be found in 1898. In Case VI the patient, a boy of seventeen, was crushed between two cable-cars. He was brought to the hospital by the ambulance suffering from marked shock. He complained of severe pain and tenderness in the right lumbar region. There was a fracture of the ninth rib on the right side. There was tenderness, and some swelling in the right lumbar region, but hæmaturia did not appear for eighteen hours, and was then but slight. Casts were also present. Slight hæmaturia existed for six days, but no positive signs of severe injury to the kidney. The patient developed a continued fever and a right pleurisy with effusion, but no positive signs developed in the loin until the fourteenth day, when a painful and tender swelling appeared in that region. Incision evacuated a large abscess occupying the site of the right kidney. The organ was for the most part disintegrated. He left the hospital, thirty-four days after admission, with a sinus in the loin, which subsequently healed. He had no pyuria at this time. This patient regained his health completely, and served in the army in Cuba this summer. He returned to America after the campaign, and died of typhoid fever in Boston.

In Cases II, III, and V, in which nephrectomy was done,

the urine showed some evidences of congestion of the remaining kidney. The mortality of nephrectomies for injury was $33\frac{1}{3}$ per cent.

CASE I.—*Rupture of the Kidney; Nephrotomy*.—W. W., aged twenty-seven years, was admitted March 30, 1893. Patient fell some distance, striking on the right side, and suffered immediately severe pains in the loin. When brought to the hospital was suffering from moderate shock. An ill-defined tumor can be felt in the right loin; marked hæmaturia.

Operation, by Dr. Hartley, March 30, 1893. Curved five-inch incision, convex downward below the ribs; kidney exposed. Underneath the fatty capsule there was extravasated blood; there was much contusion of the kidney, which was considerably enlarged and ecchymosed. The substance of the kidney was incised and a large mass of blood-clots and disorganized kidney-tissue removed. The cavity was packed with iodoform gauze, the wound partly closed by stitches. After the operation abundant urine was passed.

Wound healed without pus, and patient was discharged, well, June 11, 1893.

Subsequent History.—In good general health September, 1898. Had no trouble after leaving the hospital.

CASE II.—*Rupture of the Kidney; Nephrectomy*.—A. R., aged sixteen years, was admitted May 28, 1894. One week ago patient fell, striking against a wooden obstacle, injuring his right lumbar region. He walked home; has since remained in bed; urine red after the accident. Examination showed a well-nourished boy; temperature 99° F., pulse 100. His tongue was coated, urine diminished in quantity, from eight to fourteen ounces in twenty-four hours. It was brownish in color and contained a small amount of blood. There was pain and tenderness in the right loin. The abdominal wall was rigid upon that side. Three days after admission bulging was noticed in the right loin; his urine contained pus. He left the hospital and went home and returned June 12. On June 11 he passed a quantity of blood *per urethram*. No tumor nor tenderness could be felt. Temperature 100.4° , pulse 110. Urine contained much blood. Abdominal pains. June 13, passed some clots; June 14, faint, dizzy, and vomited; passed ten ounces of pure blood. On June 16,

pulse 130; June 17, bloody urine; June 18, some tenderness in right loin; no tumor felt. The patient very pale.

Operation, by Dr. McBurney, June 18. Transperitoneal nephrectomy. Incision in right semilunar line. Kidney removed, together with its adherent fat capsule, entire. Catgut ligature of vein and of ureter; clamp left *in situ*; stump of ureter cauterized. Intravenous infusion of salt solution, but little blood lost during the operation. Urine continued bloody, diminished in quantity, of normal specific gravity, and contained casts. His pulse remained rapid and feeble, and he died June 22.

Examination.—Wound and peritoneum clean; left kidney normal, but pale. Bladder contained a firm old clot of considerable size. The right kidney removed at operation, slightly enlarged, bulging at the centre of its convex border. In the centre of the organ was a globular clot of bright red blood, embedded in clots of older date, the enclosing cavity represented the middle third of the organ; the capsule was not ruptured.

CASE III.—*Rupture of the Kidney; Nephrectomy.*—J. S., male, aged twenty-five years, was admitted August 5, 1894. On the day of admission patient fell a few feet, striking the left side of the abdomen against an embankment. Four hours later he began to feel ill; pain in the abdomen.

Examination.—Patient looked ill. Left side of abdomen tender and rigid. Flatness on percussion to median line in front; fulness of that side on palpation; fracture of the tenth rib in the axillary line. Urine contained three cylindrical blood-clots one-eighth of an inch in diameter and one-third of an inch long. Temperature 102.2° F.; pulse 90.

Operation, by Dr. Hartley, August 7. Transperitoneal nephrectomy in left semilunar line. Retroperitoneal hæmorrhage around kidney. Catgut ligature of pedicle. Kidney removed.

Pathological Examination.—The organ was extensively lacerated along its outer border and posterior surface, at the lower pole.

Wound Healing.—Normal. Discharged well October 1, 1894.

Subsequent History.—Not found.

CASE IV.—*Contusion of Kidney; Necrosis of Kidney.*—H. M., aged ten years, was admitted October 21, 1895. On day of ad-

mission thrown out of wagon by a runaway horse, striking chiefly upon the right lumbar region. When admitted presented marked shock, a scalp wound, and hæmaturia. October 22, very tender over right kidney, some swelling and induration in the same region; hæmaturia. Pulse 150; very weak. October 23, no blood in urine; patient stronger; urine normal. October 27, urine normal; improvement in general condition. Some tenderness in right lumbar region, but no tumor. Moderate rise of temperature. November 4, daily rise of temperature to 101.5° F. Urine contained albumen and pus. November 7, looks ill; tender over right kidney; temperature 101.5°.

Operation, by Dr. McBurney, November 9, 1895. Three-and-a-half-inch cut, curved convex downward below ribs on right side; kidney exposed. On posterior and outer surface of kidney was an area of necrotic tissue one inch in diameter, pale and yellow in color, one-third inch deep. Removed with curette. Surface cauterized; wound packed with iodoform gauze.

Pathological Report.—Necrosis of normal kidney tissue.

Wound healing aseptic. Urine contained a moderate amount of albumen after operation, and was diminished in quantity for one week. Left hospital, well, December 12, 1895.

Subsequent History.—Not found.

CASE V.—*Traumatic Rupture of the Kidney; Nephrectomy.*—C. R., aged twenty-two years, was admitted February 7, 1898. On the day of admission he fell over a beam on a barge and struck against a post, on the left loin. Sudden, sharp pain in the loin and prostration resulted. On admission, large robust man, very anæmic, with slow, soft pulse; some swelling and great tenderness over the left kidney. Dulness, on percussion, in the left loin, extending well forward to a line going vertically to the anterior superior spine. Half a pint of blood was drawn from the bladder through catheter. Temperature 99.6° F.; pulse 72. Urine later dark-red and opaque; much albumen and blood. On February 9, two days after the accident, pain and tenderness in the left loin much greater; bulging of the abdominal wall in this region noticed. Temperature gradually rising. Urine, specific gravity, 1028; acid; small amount of albumen, a few casts, and a few red cells. February 10, temperature rose to 104.5°; pulse 115.

Operation, February 10, 1898, by Dr. Johnson. Six-inch

incision, parallel to and one and a half inches below the ribs, beginning two inches outside the rectus. Perirenal space opened. After tearing through the fat a cavity was entered containing more than a pint of fluid blood, at the bottom of which lay the kidney, which was found torn transversely in two at its middle, its edges were extensively pulped. Blunt enucleation; free bleeding from a torn vein; catgut ligature of artery and vein; separate catgut ligature of ureter; wound partly closed; packed with sterile gauze. During the next twenty-four hours there was some oozing of blood-stained serum. Change of outside dressing. Urine thirty-four ounces, acid; specific gravity, 1030; a few white cells. Wound healing aseptically. March 10, wound healed. Urine continues abundant and normal.

Subsequent History.—In sound health October 1, 1898.

CASE VI.—*Rupture of the Kidney; Perinephric Abscess and Abscess of the Kidney; Nephrotomy.*—A. M., aged seventeen years, male, was admitted March 31, 1896. Shortly before admission the patient was injured in a cable-car collision, in which he was thrown between the cars, and his body violently squeezed. He was brought to the hospital in the ambulance, suffering from marked shock. He was pale and bathed in a cold sweat. Pulse slow. He complained of severe pain and tenderness in the right lumbar region and over the ninth and tenth ribs. Urine, withdrawn through catheter, was clear and free from blood.

Examination.—Great tenderness and some distention in the right lumbar region. Fracture of the ninth rib, right side. Crepitant râles in right chest.

The next day the urine contained a few red blood-cells and casts. His general condition had improved. For six days his urine continued to contain a few red blood-cells, but no casts. At the end of a week there was ecchymosis of the skin in both loins, low down. An indefinite mass could be felt in the right lumbar region, which was tender. About this time patient began to have fever, temperature to 102° F. He developed a right pleurisy with effusion, which was tapped twice. He gradually lost flesh and strength and had a continued fever. But little or no pain nor tenderness remained in the right lumbar region at the end of a month, nor was there an appreciable swelling to be felt. He developed pyuria and became delirious at times. Transferred to the medical ward, where he remained about a fortnight.

At the end of this time pain, tenderness, and swelling again developed in the right lumbar region. When he was again transferred to the surgical ward, an incision was made in the right loin, which evacuated a large abscess occupying the region of the kidney. The organ was mostly disintegrated, and no effort was made to remove the remnants remaining. The abscess-cavity was washed out, drained, and packed, and the patient made a good recovery. He left the hospital with a sinus in the loin, which subsequently healed. He had no pus in his urine at this time.

The patient regained his health completely, and served in the army at Santiago this summer (1898). He returned to America after the campaign, and died of typhoid fever in Boston.

CASE VII.—*Lacerated Wound of the Pleura, Kidney, and Liver.*—M. M., aged twenty-five years, was admitted July 1, 1898. While riding a bicycle patient collided with an express wagon, and was brought directly to the hospital.

Examination showed a well-developed man, with a penetrating wound of right arm in region of belly of biceps muscle, and a penetrating wound of the right chest wall at the intersection of a line two inches behind the right mammillary line and ninth rib. The man was conscious but suffered from shock. Urine contained considerable unclotted blood. Temperature 97.8° F.; pulse 100.

Operation, July 1, 1898, by Dr. Abbe. The chest wound was enlarged each way in the line of the rib for one and one-half inches. Digital examination disclosed that the original wound passed across the pleural cavity, perforated the liver, and entered the abdominal cavity, tearing the kidney at the junction of its upper and middle thirds. A small amount of free blood in the peritoneal cavity. Midway between the free border of the ribs and the crest of the right ilium a second incision was made, beginning about two inches from the median line in front and carried outward five inches. After dividing the muscular layers of the abdominal wall and pushing aside the peritoneum, the right kidney was exposed. Examination showed that the upper part of right kidney was severely contused, and somewhat lacerated at junction of the upper and middle thirds, and finger pressed into the pelvis of kidney. The wound closed, except the middle one-inch, through which packing was applied down to

the kidney. In the upper wound four inches of the ninth rib were excised, and packing passed through the pleura down to the kidney. The patient recovered, not without some complications, including empyema of right pleura, necessitating the introduction of tubes into the pleura. The upper wound also continued to discharge some urine and bile for three months. He was, however, able to leave the hospital August 24, 1898. October 1, 1898, sinus through pleura; no urine nor bile escaped; right lung still partly collapsed; general health good.

MOVABLE KIDNEYS.

The cases of movable kidney numbered fifteen. Of these two were males and thirteen were females. The ages of the males were twenty-six and thirty-seven years. The average age of the females was thirty years. The youngest was twenty years old and the eldest fifty-four. In one of the males the symptoms commenced after an accident, in which he was thrown from a carriage, receiving a fracture of the femur and other injuries. One of the females stated that the symptoms dated from a severe muscular effort, during which she felt something snap in her loin, and she fell unconscious from pain. Two only of the female cases are *said* to have borne children. Eight were unmarried. In six cases the patients were described as being poorly nourished. In one case evidences of tight lacing were marked.

Symptoms.—In nine cases constant pain was complained of, variously described as dragging in the back and loins or abdomen, dull or of a sharp and stabbing character, shooting down in the groin. In five cases the pain was referred to the abdomen rather than to the back. In five cases distinct attacks of pain occurred in addition to the constant distress, accompanied by nausea and vomiting, and in three cases by marked prostration.

In nearly every instance the pain was rendered worse by exercise. Severe headache was complained of in three cases. No special changes in the urine were noted, except in one case, in which the urine contained blood.

Methods of Examination.—Bimanual palpation of the abdomen, in the dorsal position, in the lateral semiprone position, in the knee-chest position, and in the partly erect position, the body bent forward, the shoulders supported, and the abdominal muscles relaxed, were all used.

The knee-chest position seemed especially favorable in several instances. In every case a more or less movable abdominal tumor was felt, corresponding in size and shape to the kidney. In one case both organs were movable and palpable, corresponding to bilateral symptoms.

Operative Methods.—The following description will answer for most of the cases: In a few cases the direction of the incision was varied to obtain more space. The patient was placed in the lateral prone position with a cushion under the opposite loin. A three-inch to five-inch incision was made, beginning at the anterior border of the erector spinæ muscle, just below the last rib, extending obliquely downward and forward. Division of muscles to the same extent. Incision of the lumbar fascia. Blunt dissection of the perirenal fat and exposure of the kidney. At this point in the operation the kidney was usually pressed up into the wound through the abdominal wall. An incision of two to two and a half inches in length was then made in the capsula propria of the kidney, along the junction of the outer convex border, to the posterior surface of the organ. The capsule was stripped one-half inch from either margin of the wound. The capsule was then sutured to the muscular edges of the wound, with from four to ten interrupted catgut sutures. The deep and superficial portions of the wound were then closed with catgut and silk sutures respectively. A space of one and a half to two inches in length was left in the middle of the wound, through which sterile gauze packing was introduced down to the exposed surface of the kidney. The central part of the wound was allowed to close from the bottom by granulation. This operation was varied in one case as follows: A five-inch incision was made, beginning in the midaxillary line, one and a half inches below the costal border, passing

downward and forward, parallel to the fibres of the external oblique muscle. The muscular layers were split in the direction of the course of each layer without division of the fibres. The peritoneum was pushed towards the median line, and the kidney was exposed. The capsule was incised for two inches and stripped slightly from the surface of the organ. Two silkworm-gut sutures were passed through the capsule, one on either side, and through the corresponding muscular wall of the wound. Continuous catgut suture of the muscular layers; continuous catgut subcuticular suture of the skin. No drainage. In this case the patient had had severe attacks of renal pain at intervals of one month. It was thought that a stone might be present in the kidney. None was found. In thirteen cases the right kidney was movable; in one case the left; and in one case both kidneys were movable, and were operated upon; an interval of five weeks intervening between the operations. All the patients recovered without serious post-operative complications.

The average stay in the hospital of these patients was thirty-seven days. In fourteen cases the healing of the wounds was aseptic. In one case slight suppuration occurred. In thirteen cases the patients left the hospital free from the symptoms from which they had suffered. In two cases the symptoms were not improved. The subsequent history of these patients has been obtained in the following cases: In one case there has been no return of the symptoms after eighteen months; in one case after seven months; in one case after seven years. In one case the patient writes that the kidney broke away after three months. She entered another hospital where the kidney was removed. At present, after three years, she states that her health is good. In one case the patient states that at present, fifteen months after operation, she has pain in the kidney, which appears to her to be movable. The patient has chronic phthisis, and was an unfavorable subject. Of seven cases heard from, five remain well. Two complain of lumbar pain.

PERINEPHRIC ABSCESS.

There were three cases operated upon for abscess in the neighborhood of the kidney, in which the organ itself did not appear to be involved in the disease. The patients were all males. Their average age was twenty years. The eldest was twenty-seven, and the youngest ten years of age. In Case I no cause could be assigned for the infection. The urine was negative. In Case II the abscess occurred during convalescence from typhoid fever. The urine contained a few pus-cells. In Case III it followed a subcutaneous injury to the loin. The urine was negative. In all three cases there were marked general symptoms of septic infection, continued fever of an irregular remittent type, and prostration. The local symptoms were swelling, induration, tenderness, and pain in the loin. Distinct fluctuation was noted in Case II. The abscesses were treated by free incision in the lumbar region. The cavities were washed with sterile salt solution, wiped dry, and packed with sterile gauze. All the patients recovered, and left the hospital well after an average stay of ninety days. The longest stay was 167 days, the shortest twenty days. One patient, a boy, aged ten, whose abscess followed an injury to the loin, was in good health October 1, 1898, one year after operation. The other two patients could not be found.

CASE I.—*Perinephric Abscess; Lumbar Incision.*—John C., aged twenty-seven years, was admitted November 19, 1892. Previous history negative.

Present History.—One month ago he began to feel ill and had a pain over the left kidney, since when he has continued to grow worse and has fever. November 17, needle introduced into the left lumbar region withdrew pus. Urine negative.

Operation, by Dr. McBurney, November 23, 1892. A large perinephric abscess was evacuated through a lumbar incision. February 13 he left the hospital, with a sinus, improved in general health.

Subsequent History.—Not found.

CASE II.—*Perinephric Abscess; Lumbar Incision*.—James F. M., aged twenty-four years, was admitted November 28, 1894.

Present Illness.—Typhoid fever twelve weeks ago, which ran an ordinary course. During convalescence began to suffer from pain in the abdomen. Four weeks ago pain localized in the right lumbar region; has night-sweats. Patient is pale and emaciated; urine alkaline, specific gravity, 1028; contains a few pus-cells. There is a large, tender, fluctuating mass in the right lumbar region, flat on percussion, extending from the twelfth rib to the iliac crest and as far forward as the axillary line.

Operation, November 27, 1894, by Dr. McBurney. Four-inch oblique incision; large and comparatively superficial abscess was opened; kidney not felt; packing.

Wound healing by granulation. Left the hospital December 16, 1894.

Subsequent History.—Not found.

CASE III.—*Perinephric Abscess; Lumbar Incision*.—Fred. W., male, aged ten years, was admitted September 7, 1897.

Present Illness.—Fell on the day of admission, striking on his right side, in the lumbar region, sustaining a severe contusion of the genitals.

Physical Examination.—Tenderness over the right kidney; extensive ecchymosis of the penis. The patient developed a continual fever, and on September 26 marked tenderness and induration was noticed in the right loin. Urine negative.

Operation, September 29, 1897, by Dr. Johnson. Two-and-a-half-inch incision in the right lumbar region. Large perinephric abscess opened. Kidney feels normal. Wound cleaned and packed.

Wound Healing.—Wound closed down to a sinus, which remained unhealed January 20. January 27, incision and curetting of sinus. Wound healed, and patient left the hospital March 13, 1898.

Subsequent History.—General health good September, 1898.

ABSCESS OF THE KIDNEY AND SUPPURATIVE NEPHRITIS.

These cases numbered twelve, eight males and four females. Their average age was twenty-nine years. The youngest was seventeen and the oldest was thirty-eight years of age.

Etiology.—Cases I, II, III, IV were females. In Case I there had been a history of cystitis of unknown origin, lasting two years. The patient was married and a multipara.

In Case II there was a history of cystitis, following puerperal sepsis; the cystitis had existed for eight months.

In Case III no cause was assignable. The patient was unmarried.

In Case IV no cause was assignable. The patient was married.

Cases V–XII were males.

In Case V no cause was assignable.

In Case VI there was a history of gonorrhœa fourteen years before, and of a compound fracture of the tibia, followed by necrosis, twelve years before. These conditions bore no apparent relation to the kidney-disease.

In Case VII there was a history of injury to the loin five months before admission to the hospital, followed by more or less constant pain in the loin, ever since the accident.

In Case VIII there was a history of chronic gonorrhœa, which seemed to bear a definite causative relation to the kidney-disease.

In Case IX no cause was assignable, except infection of the bladder through instrumentation. The kidney trouble apparently antedated the use of instruments. Trouble afterwards found to be tuberculous.

In Case X the disease immediately followed an attack of acute gonorrhœa.

In Case XI there was no assignable cause.

In Case XII there had been numerous attacks of gonorrhœa, which seemed to bear a distinct causative relation to the disease of the kidney.

In Case I (female) the affection of the kidney seems to have taken place through an ascending pyelitis of a chronic character, following a chronic cystitis of unknown origin. The appearance of definite kidney symptoms and of pronounced systemic infection seemed to have occurred very suddenly, and yet the condition of the kidney after its re-

moval, three weeks after the appearance of signs, pointing to the kidney as the seat of disease, showed that the inflammatory process must have existed for many months. It was probably tubercular, with subsequent pyogenic infection.

In Case II cystitis following labor first gave symptoms pointing to an ascending pyelitis and to infection of the kidney after four months. The destruction of the organ was complete four months later, when an enormous abscess existed in the loin, and was opened.

In Case III the signs of pyelitis developed suddenly, without apparent cause, in an unmarried female, otherwise healthy. The pyuria was more or less intermittent in character, and the disease had existed for two years before operation, when the kidney was removed, and was found much enlarged and riddled with abscesses. Some kidney-tissue remained, everywhere infiltrated with pus. There was no sign of tubercle.

In Case IV the disease seems to have been primary in the kidney; commencing suddenly with severe renal pains, followed by hæmaturia and soon by pyuria. The duration of the disease had been four years. The general health had suffered greatly. Several large abscesses in the kidney-substance were evacuated. No stone was found.

In Case V, male, the disease was apparently primary in the kidney. There was a history of renal pain and tenderness of a year or more in duration, coming on suddenly, without assignable cause. Pyuria, ardor urinæ, frequency followed, and a renal tumor gradually formed. The general health had suffered. There had been continued fever. A large renal and perirenal abscess were evacuated.

In Case VI, male, apparently primary in the kidney. There had been a sudden invasion without assignable cause. Severe continuous renal pain. No pyuria. There had been loss of health and strength, continued fever, and the formation of a renal tumor. Incision of perirenal abscess; small abscess in the kidney-substance surrounded by infected granulation tissue.

In Case VII, male, there had been a history of injury to the loin six months before, with fracture of three ribs on the left side, followed by renal pain and tenderness, chills, continued fever, the formation of a kidney tumor, emaciation, and anæmia. The urine was bloody and purulent. Incision of perirenal and renal abscesses. Two years later secondary abscess opened; two months later another. On account of dense adhesions the kidney could not be removed.

In Case VIII there had been a history of chronic gonorrhœa, ascending pyelitis, and, nineteen months before, of renal pain with the formation of a renal tumor, accompanied by fever and prostration and impairment of general health. Incision of a renal and perirenal abscess. One year later another, and on admission to the hospital a third. An attempt to remove the kidney, one year later, failed on account of dense adhesions.

Case IX is interesting, because the symptoms were so completely referred to the lower genito-urinary tract that several operations had been done elsewhere, under the impression that the bladder was the seat of the disease.

In Case X there was gonorrhœa of eight weeks' duration, ascending pyelitis, sudden pain in the left kidney eight days before admission, which had continued. Cessation of urethral discharge; a septic temperature from 99° to 104° F.; pyuria. The left kidney was much enlarged and tender. Incision into the left kidney on the third day after admission. An abscess in the kidney-substance opened, which contained three ounces of pus. Tube drainage; continued fever and much discharge of pus. The kidney remained large and tender. Fourteen days later extraperitoneal nephrectomy. The capsule of the kidney thickened and indurated. Subcapsular nephrectomy; subsequent extirpation of the capsule. The kidney was found increased in size. There was a large abscess in the middle of its external surface, and several smaller independent abscesses. The pelvis was not markedly inflamed.

Case XI, male. Unknown origin. Apparently pri-

mary in the kidney. Four years ago abscess of the kidney. One month ago pain, swelling, and tenderness in the right lumbar region; continued fever; urine negative. A large abscess opened in the loin corresponding to the site of the kidney. The organ entirely destroyed.

Operative Treatment.—Those cases in which the abscess had invaded the perirenal structures were treated by incision and drainage of the kidney, followed later by nephrectomy, except in those cases where the wound healed without further operation, or where the removal of the organ was too hazardous on account of dense inflammatory infiltration and adhesions to the surrounding parts.

The incisions for drainage were made in the loin, and were usually oblique or horizontal, and of such length as seemed necessary to secure proper access to the kidney, and to provide for efficient drainage.

Seven cases were treated by incision and drainage merely. Of these four left the hospital with a sinus in the loin. Of these four one could not be found, one is in perfect health two years after operation, and the other two still have a sinus in the loin, but are in good general health, three and four years after operation respectively, October, 1898. One of them wears a small drainage-tube from time to time.

In the three remaining cases the abscess-cavity healed completely after one or more incisions, and the patients left the hospital in good health. They could not be found in October, 1898.

Five cases were treated by nephrectomy as the primary operation. In three of these transperitoneal nephrectomy was performed.

In Case III it was found that the removal of the kidney through the loin was impracticable behind the peritoneum. The incision was six inches long, below and parallel to the last rib. The peritoneum was opened and the kidney freed by blunt dissection and removed. Previous examination of the right kidney had been made by a small incision in the right linea semilunaris, just below the ribs.

In Case I the ureters were catheterized and purulent urine collected from the left ureter; that from the right was clear and normal. The left kidney was enlarged, tender, and movable; the left ureter could be felt distinctly enlarged. A seven-inch incision in left linea semilunaris opened into the peritoneal cavity. The colon was pushed inward, and the posterior layer of the peritoneum was incised over the kidney. There were many adhesions and the enucleation was difficult.

In two cases nephrectomy was done as a secondary operation.

In Case X fourteen days after the incision of an abscess in the kidney-substance. The indications were that the discharge of pus from the kidney continued profuse, the patient continued to have much pain, a septic temperature, and the kidney remained large and tender. A seven-inch vertical cut from the ribs downward two and a half inches internal to the anterior superior spine of the ilium. Peritoneum opened to the extent of three inches and diseased kidney palpated. Suture of wound in peritoneum. Extraperitoneal enucleation, first of the kidney, then of its thickened capsule.

In Case IV incision of abscesses in kidney was followed one year later by nephrectomy, in another hospital, by one of the members of the Roosevelt staff.

Among the twelve cases of abscess of the kidney there was no death. In the five cases in which nephrectomy was done the results were as follows: Case I (female) left the surgical ward with cystitis, otherwise well. Her cystitis persists at present, and she wears Bozeman's apparatus still. Case III (female) left the hospital one month after operation, with slight pyuria, otherwise well. October, 1898, fifteen months later, she was in excellent health, with no symptoms of urinary trouble. Case IV (female), incision of abscesses in kidney, left the hospital after a month, with a urinary and pus-sinus in the loin. Six months later entered another hospital, where nephrectomy was done. Followed six months later by an abscess and the formation of a fæcal fistula. Six months

later operation for closure of fæcal fistula. One year later sinus was healed, and at the present time, six months after the sinus finally closed, suffers from cystitis, but is otherwise in good health. Case IX, primary transperitoneal nephrectomy for multiple abscesses of kidney, left the hospital with wound healed two months after operation. At present, nearly three years later, he is in good health, although he still has frequent urination and his urine occasionally contains a trace of blood. Case X, extraperitoneal nephrectomy fourteen days after incision of kidney abscess, left the hospital two months after operation, with a small fæcal fistula existing in the loin, which closed spontaneously. Two years and seven months later was in sound health. No urinary symptoms.

ABSTRACTS OF CASE-HISTORIES.

CASE I.—Johanna S., aged twenty-nine years, married, was admitted June 19, 1895, to surgical ward.

Previous History.—Her last child was born in 1883. In 1893 she had a severe attack of cystitis. On admission to gynæcological division of this hospital, April 23, 1894, complained of painful and frequent urination and pain in back. Both ureters thickened. Bladder drainage and irrigation through the vagina. Long illness and several operations on bladder. June 1, 1895, chills and fever; severe pain in left lumbar region; loss of flesh and strength. June 19, urine from the left ureter contained pus; that from the right was clear. Transferred to surgical ward.

Physical Examination.—A movable, tender mass was felt in left side of the abdomen, extending well below the ribs. Patient emaciated; continued fever; urine turbid, alkaline, pus, hyaline and granular casts.

Operation, by Dr. McBurney, June 21, 1895. Seven-inch cut in the left linea semilunaris downward and then outward, ending one inch and a half from the middle iliac crest. Peritoneum opened. The enlarged lower end of the kidney is seen behind the peritoneum, outside the colon. Posterior layer of peritoneum incised and kidney exposed. Enucleation difficult on account of adhesions. Clamps left on artery and vein. Ureter cut, burned, and tied. Salt infusion on account of shock.

Pathological Report.—Kidney is enlarged; there are multiple abscesses in the substance of the organ, some of them large and thin-walled. The kidney-tissue mostly replaced by fibrous masses. The pelvis of the kidney contains pus, and was the seat of suppuration.

Wound Healing.—Clamps removed on the third day. Urine, specific gravity, 1023; much albumen and pus. July 29, small superficial granulating wound; returned to gynæcological division for treatment of cystitis. Improved.

Subsequent History.—Three and a half years later, general health good; cystitis persists; still wears Bozeman's irrigator. No attempt made to close vesico-vaginal fistula.

CASE II.—Ellen F., aged twenty-eight years, married, was admitted September 26, 1895.

Previous History.—Last child born January, 1895. Difficult labor and very slow convalescence. Four months ago she began to have continuous pains in the left lumbar region and to lose flesh and strength. Since her child was born she has had frequency and cloudy urine.

Present Illness.—One week ago she had severe pain in the left loin, extending to the iliac region and thigh, nausea and vomiting, swelling in the left lumbar region, and continued fever.

Physical Examination.—The patient was profoundly anæmic; urine, specific gravity, 1020; acid; much pus. There was bulging and fluctuation in the left loin.

Operation, September 27, 1895, by Dr. Hartley. The condition of the patient being bad, an infusion of salt solution was given. An incision was made, beginning one-half inch below the free border of the ribs, at the edge of the erector spinæ muscle, downward a short distance, then inward in the direction of the navel, five and a half inches long, and a large abscess opened. The kidney is mostly destroyed. There are pus-tracts along the crest of the ilium and upward to the diaphragm. The cavity is very large.

Wound Healing.—October 7: The cavity is much smaller and the discharge slight. December 29: There is a sinus in the loin two inches deep and admitting a finger. The patient's general condition was improved.

Subsequent History.—The patient continued to return to the

Out-Patient Department for more than two years. She regained the appearance of good health; but a tube was necessary in the sinus to prevent the occurrence of retention of pus. This being neglected she developed septic symptoms at once. In the summer of 1898 a sinus was still present, and a tube had to be worn from time to time. General health good.

CASE III.—Eleanor I., aged twenty-eight years, single, was admitted January 28, 1898.

Previous History.—Negative.

Present Illness.—Two years ago sudden, severe pain in the right lumbar region, followed by chills and fever, prostration, vomiting. Two days later pyuria and ardor urinæ. During the next twenty-four hours a large amount of pus was passed with the urine, and this was followed by relief of the symptoms. Since then she had more or less constant pain in the right lumbar region and pyuria. At intervals she had suffered from severe attacks of pain, accompanied by a sense of fulness and tenderness in the hypogastrium; these attacks would be followed, at the end of twenty-four or forty-eight hours, by the appearance of an increased quantity of pus in the urine and by amelioration of the symptoms.

Physical Examination.—Patient was well nourished and appears to be in good health. There was a tumor in the right side of the abdomen, extending from the border of the ribs to the iliac crest, and nearly to the median line in front (three inches). The tumor was tense, semifluctuant, smooth, ovoidal in shape, somewhat movable. Tender on pressure. Dull on percussion in the loin, tympanitic in front. Temperature 98.6° F.; pulse 80. Urine cloudy, amber, acid; specific gravity, 1024; much pus.

Operation, by Dr. McBurney, January 29, 1898. Exploratory incision, two inches long, at the outer border of the rectus, on the right side, one and a half inches below the ribs. Muscles split, peritoneum opened, and left kidney palpated and found normal in size and consistence. Suture of wound. Six-inch incision in the left loin one inch below and parallel to the ribs. Extraperitoneal enucleation failed on account of the dense adhesions, which everywhere bound the kidney to the surrounding parts. Peritoneum opened and kidney freed by blunt dissection. Catgut ligatures of artery and vein. Ureter found thickened but not distended; a clamp was left upon its stump. Suture of the

peritoneum; partial suture and packing of the remainder of the wound.

Pathological Report.—Kidney was six inches long, three inches wide, two inches thick; surface was smooth; on section numerous separate abscess-cavities filled with thick yellow pus. Considerable kidney substance still remained, which was everywhere infiltrated with pus. No signs of tubercle. Wound healing aseptic. On February 28, 1898, the patient was entirely free from pain and discomfort, the wound was reduced to a small superficial granulating area. Urine acid; specific gravity, 1016; slightly purulent.

Subsequent History.—In sound health September, 1898. No symptoms of urinary trouble.

CASE IV.—Emma M., thirty years of age, married, was admitted September 18, 1895.

Previous History.—Four years ago, taken suddenly ill with sharp pain in the region of the kidney, extending down to the groin and thigh; duration four hours, followed by frequency and hæmaturia. Many similar attacks have occurred since. Urine constantly purulent and often bloody. Great frequency and ardor urinæ existed; of late a chill and fever have accompanied attacks of pain. Patient was weak, emaciated, and had no appetite.

Examination.—Slight fever; rapid pulse; urine, specific gravity, 1020; cloudy, acid, much pus, and a few red cells.

Operation, September 25, by Dr. Hartley. Four-and-a-half-inch lumbar incision; kidney enlarged; incision of several large and small abscesses in the substance of the organ.

Pathological Report.—Simple Inflammation.

Wound healing by granulation, October 22. Still has a good deal of pain. There is a sinus leading into the kidney which discharges pus and urine in small amounts. Discharged, improved, October 22.

Subsequent History.—Nephrectomy, by Dr. George Crary, April 10, 1896. An abscess occurred in the scar September, 1896, which was opened by Dr. H. C. Taylor. In March, 1897, operation by Dr. Crary, at the Cancer Hospital, for closure of a fæcal fistula, which resulted from the abscess. The sinus left after this operation finally closed in May, 1898, since when patient has remained in good general health, except for the persistence of a troublesome cystitis, which continued to cause, in September, 1898, painful and frequent urination.

CASE V.—David R., aged thirty-one years, male, was admitted June 19, 1890.

Previous History.—Intermittent pain in the right lumbar region and ardor urinæ. Seven months ago the pain became more severe and continuous. Four weeks ago the patient noticed the presence of a tumor in right flank.

Physical Examination.—A tumor of some size can be felt in the right lumbar region, which is tender upon pressure. A needle introduced into the tumor withdrew pus. The patient suffered from slight continued fever. The urine, specific gravity, 1012; albumen, 10 per cent., and pus.

Operation, June 19, 1890. Incision and drainage of abscess by Dr. McBurney. An incision three inches in length was made on the right side, parallel to the last rib. One and a half pints of pus was evacuated from outside of and within the kidney. The patient was discharged, improved, July 30, 1890, with sinus.

Subsequent History.—Not found.

CASE VI.—Peter C., aged thirty-four years, male, was admitted June 28, 1891.

Previous History.—Gonorrhœa fourteen years before. Necrosis of tibia following compound fracture fourteen years before. Cough with loss of strength and flesh six months ago.

Present Illness.—Six months ago severe pain in the right lumbar region, which has become continuous. One chill.

Physical Examination.—Right side of abdomen resistant; flatness as far forward as line of anterior superior spine of ilium. Tenderness over the right kidney. Needle withdrew pus. Temperature 100° to 102° F.; pulse, 85 to 90. Urine negative.

Operation, by Dr. McBurney, June 30, 1891. Incision of abscess. Oblique incision three inches long, downward and forward, in lumbar region. Small cavity containing pus and granulation tissue scraped off kidney-substance. Glass drain and packing.

Wound Healing.—Fæcal fistula formed, which slowly healed. Patient left the hospital with a small sinus fifty-five days from operation. Several months later sinus was healed. Recovery complete.

Subsequent History.—Not found.

CASE VII.—Arthur L., aged thirty-five years, male, was admitted January 12, 1892.

Previous History.—Negative.

Present Illness.—Five months ago fell a distance of several stories, fracturing several ribs on the left side. He was six weeks in the hospital. Soon after his discharge he began to have pain in the lower part of the abdomen, with chills and fever.

Physical Examination.—On admission, temperature 99.4° F.; pulse, 92. He is thin and anæmic. There is pain and tenderness in the left lumbar region, extending into the hypogastric region. Flatness on percussion in the left lumbar region. Urine, amber, acid, specific gravity, 1024; albumen, trace; abundant red cells and granular material.

Operation, January 16, 1892, by Dr. McBurney. Oblique lumbar incision; large perirenal abscess. Kidney enlarged. Incision into its substance evacuated pus. Rubber tube in kidney-wound packed.

Wound Healing.—Closed to a sinus February 12, 1892. Discharged March 11, 1892. On May 14, 1894, patient was readmitted to the hospital. For ten days he had had pain and tenderness in the left lumbar region. Five days previous a discharge of pus took place through the centre of the old scar, which continued. He suffered from headache and malaise. Urination normal. Urine cloudy, pale, acid, albumen, and pus.

Operation, May 19, 1894, by Dr. Hartley. Eight-inch curved incision, downward and forward, beginning at the posterior end of the old scar. Thick flap raised and abscess opened; cleaned out and trabeculæ broken up. Sinus cut out. Drainage at side of sinus. Wound healed *per primam*, except sinus. July 2: Pain in the kidney. July 4: Secondary abscess opened through the sinus with a probe. An abdominal tumor could be felt distinctly at the side of the kidney.

Operation, August 1, by Dr. Hartley. Large abscess cavities extending downward towards the pelvis opened, drained, and packed. Kidney could not be removed. Wound healed December 27, 1894.

Subsequent History.—Not found.

CASE VIII.—Will. C., aged thirty-eight years, was admitted July 12, 1893.

Previous History.—Chronic gonorrhœa for fifteen years, followed by stricture, perineal abscesses, and fistulæ, for which many operations were done. Nineteen months ago general

health suffered, and a tumor appeared in the lumbar region of the left side. Incision evacuated much pus. Eight months ago another abscess appeared at the same site, which was opened. Three weeks ago another, spontaneously opening.

Physical Examination.—Patient was well nourished, bladder atrophied, containing but three to four ounces of urine. Several scars in the left loin, and a sinus leading to an abscess-cavity. Urine contained much pus.

Operation, July 12, 1893, by Dr. McBurney. Incision and scraping of the sinus which seemed to communicate with the kidney. Left the hospital July 18, 1893. July 16, 1894, re-entered the hospital. Has worn a drainage-tube since the last operation. Chief complaint, frequency of urination.

The sinus discharges a little pus. The urine is free from pus.

Operation, July 16, by Dr. McBurney. Lumbar incision. Nephrectomy abandoned on account of extensive adhesions. He left the hospital August 4, 1894, with a clean sinus two inches deep. No improvement in frequency.

Subsequent History.—September, 1898, general health fairly good. Urine generally free from pus. A sinus persists in groin, which is dressed daily and discharges but little. Is engaged constantly in active mental and physical labor.

CASE IX.—L. M., aged seventeen years, single, was admitted October 18, 1895.

Previous History.—Seven years ago hæmaturia of two weeks' duration. Four months later another attack, with severe pain and irritation of bladder. Median lithotomy done. No stone found. Perineal fistula, which has never healed, in spite of several plastic operations. Later suprapubic cystotomy was done, and the perineal fistula closed. Pain in penis and bladder not relieved by these operations.

Three months ago began to have chills and fever, his urine was said to have contained much pus at or about this time. No pain in the region of kidneys. He has recently lost flesh and strength. No history resembling renal colic. For past week the perineal sinus has reopened and discharged pus.

On admission to the hospital the boy was thin and anæmic; he complained of a purulent urethral discharge. Pain in glans penis, frequent desire to urinate, with ardor urinæ. Temperature

and pulse normal. A large mass can be felt in the belly, extending from the right lumbar region as far down as the navel and to median line in front. The tumor is freely movable, not tender; flat on percussion. Does not move on respiration, and may be thus differentiated from lower border of the liver which overrides it. Pressure on the tumor causes pain or discomfort in the bladder and penis. Urine, specific gravity, 1010, acid, abundant pus. No tubercle bacilli.

Operation, October 19, 1895, by Dr. McBurney. Six-inch cut, parallel to the ribs, one and a half inches below their free border, beginning external to border of erector spinæ. Peritoneum opened, exposing an enlarged kidney. Posterior layer of peritoneum divided, and kidney freed by blunt dissection from surrounding structures. Ureter cut between catgut ligatures. Artery and vein clamped, and clamps left *in situ*. Kidney removed. The stump of ureter was cauterized, tied, and again cauterized. Wound packed with iodoform and sterilized gauze. Upper and inner half of the wound sutured. Salt infusion on account of shock.

Pathological Report.—Ureter much thickened, three-fourth-inch in diameter. The pelvis was filled with pus. Kidney was made up of a number of abscess-cavities, containing thick greenish-yellow pus. The walls of these cavities consisted of fibrous tissue. The shell was very thin in spots. Some of the abscesses did not connect with the renal pelvis. There were very few perinephric adhesions.

Wound Healing.—The patient passed abundant urine during the days following the operation. October 20 the pain in the bladder and penis had disappeared. October 22, clamps removed. The patient's temperature soon fell to normal, although on the day following the operation it rose to 103.5° F. The wound closed rapidly. The urine soon became almost free from pus. He left the hospital, well, January 8, 1896.

Subsequent History.—The patient states, October, 1895, two and three-quarter years after operation, that he is at present in fair health. He still suffers from frequent urination, although the capacity of his bladder is growing. He still passes a little blood in urine at times, which, he states, comes from the bladder. His urine was examined about one year ago, by Dr. Samuel Alexander, and was found to contain many tubercle bacilli.

CASE X.—Robert R., aged twenty years, single, was admitted December 21, 1895.

Previous History.—Gonorrhœa eight weeks ago. Eight days ago sudden sharp pain in the left lumbar region, followed by continuous dull pain in same region, and tenderness over the left kidney. Has been running a septic temperature from 99° A.M. to 104° P.M. No cystitis. No urethral discharge at present.

Physical Examination.—Left kidney much enlarged, tender, slightly movable. Temperature on admission 102° F.; pulse 110. Ice-bag to kidney. December 23, temperature 104°, restless and irritable; chill; severe pain in kidney. Urine, specific gravity, 1022; acid; pus abundant.

Operation, by Dr. McBurney, December 23, 1895. Three-inch oblique lumbar cut. Right kidney exposed. Needle introduced into its substance withdrew pus. One-inch cut into the organ gave escape to three ounces of pus. Rubber tube placed in the wound of kidney. Wound packed with iodoform gauze. December 24, urine, acid; specific gravity, 1028; few pus-cells. Temperature, 102.4° F. December 25, temperature 99°; some pain; a good deal of discharge. December 26, temperature, 104°; severe pain in back. December 27, wound clean; tube removed.

January 6, 1896: Patient continued to run a septic temperature and the kidney mass remained large and tender. Urine free from pus.

Operation, January 6, 1896, by Dr. McBurney. Seven-inch vertical cut. Two and a half inches internal to anterior superior spine of ilium, beginning just below the ribs. Peritoneum opened to the extent of three inches. Left kidney palpated and found enlarged. Suture of peritoneum. Peritoneum stripped away externally and kidney exposed behind peritoneum with some difficulty. Kidney moderately enlarged, very adherent to its fatty capsule, which was infiltrated and greatly thickened. Ureter cut between double catgut ligatures. Artery and vein clamped. Subcapsular enucleation of kidney. Subsequent enucleation of thickened capsule. Clamps left *in situ*. Sterile packing. A rubber tube placed in former lumbar wound for drainage. Intravenous salt infusion.

Pathological Report.—The capsule of kidney was greatly thickened. Kidney increased in size. A large abscess was situ-

ated in the middle of its external surface, surrounded by several small dependent abscesses. Pelvis normal. January 7, urine, acid; specific gravity, 1028; a few white cells.

Wound Healing.—Clamps removed on the third day. Patient had moderate fever, but the wound closed rapidly. Fæcal fistula at lower part of wound; small, February 10. Urine alkaline; specific gravity, 1009; pus and red blood-cells. February 29: Was gaining strength; fæcal fistula still persists. March 5, 1896: Well.

Subsequent History.—Returned March 21 to have the fæcal fistula closed, but refused operation, and went away March 25, 1896. Reports October 7, 1898, is in excellent health. No urinary symptoms. Has been since married, and is father of a healthy child.

CASE XI.—Charles S., aged twenty-four years, was admitted July 11, 1896.

Previous History.—Denies venereal disease. Four years ago pain and swelling in the right lumbar region. Operation for "abscess of kidney." After recovery remained at work until one month ago. Since when pain in right lumbar region, frequent urination, and gradual swelling at site of pain.

Physical Examination.—Tenderness and a deep-seated mass of induration in the right lumbar region. Temperature, 100.4° F.; pulse, 100; urine negative.

Operation, July 16, 1896, by Dr. Crary. Four-inch lumbar incision. Abscess opened correspondingly to site of kidney. Cavity two by four inches with necrotic walls. There was an orifice at lower end of abscess, which seemed to correspond to pelvis of kidney. Dense surrounding infiltration.

Wound healing by granulation. Left the hospital August 12, 1896, well.

Subsequent History.—Not found.

CASE XII.—Joseph R., aged thirty-five years, male, was admitted April 19, 1897. Alcoholic; rheumatism; numerous attacks of gonorrhœa.

Present Illness.—Has had a urethral discharge and frequent and painful urination, with pain in the lumbar region, left. For past few months several attacks of radiating pain from lumbar region to groin. Began to have general malaise and constant dull pain in left loin. Ten days ago noticed a swelling in the

left groin. For past few days has had nausea and vomiting; anorexia; prostration; night-sweats.

Physical Examination.—Poorly nourished individual. Appeared to be septic from color of skin. In the left lumbar region a slight fulness was noticeable, also marked resistance and muscular rigidity and tenderness on deep pressure. Just internal to left anterior spine of the ilium was a swelling two inches in diameter, obliterating the fold of groin; tender, not red; elastic and semifluctuating. Slight impulse on coughing; percussion note dull. Enlarged glands in groin of same side. Temperature, 99° F.; pulse, 76. Urine acid; specific gravity, 1020; albumen, trace. Much pus and granular casts.

Operation, by Dr. McBurney, April 26, 1897. Oblique lumbar cut one inch below last rib, at anterior border of left erector spinæ muscle, downward and forward to a point three inches internal to the anterior superior spine, and just above iliac crest. Lumbar fascia was œdematous and bulged into the wound. Incision into fascia evacuates a large quantity of foul pus. Wound enlarged and hand introduced into a large abscess-cavity, which occupies the site of the left kidney. No trace of kidney found. Walls of cavity cleaned and curetted and washed with salt. A pus-tract is followed with probe downward and forward to Poupert's ligament, where a counter-opening is made. Packing and tube drainage. The patient continued to pass sufficient urine after the operation. The large wound continued to discharge much pus for many months. His general health gradually improved, and he left the hospital with two sinuses, one in the lumbar region and the other in the groin, which discharged a little pus from time to time, but did not give much inconvenience. February 28, 1898, in good general health.

(TO BE CONTINUED.)

FRACTURES OF THE INTERNAL CONDYLE OF
THE HUMERUS AND THE CORRECTION
OF THE RESULTANT DEFORMITY
BY OPERATIVE MEASURES.¹

BY GWILYM G. DAVIS, M.D.,
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FRACTURES of the internal condyle of the humerus may conveniently be classified as being of two kinds, one intracapsular, involving the trochlear surface, and the other extracapsular, detaching the so-called epicondyle, and not involving the joint. In young people this may be simply a separation of the epiphysis. The nomenclature and classification of fractures of the lower end of the humerus varies so much with different writers as to cause considerable confusion as to what is actually meant.

In order to make the subject clear, it may be said that there are four centres of ossification to the lower end of the humerus: one for the trochlea, one for the capitellum, and one for each of the condyles. It has become customary, however, for surgeons to speak of fractures involving the trochlea or capitellum as fractures of the internal or external condyle. In order to distinguish fractures which separate the condyles alone, we may designate them as extracapsular, while those which go farther in and pass through the joint surfaces may be called intracapsular fractures, of either the external or internal condyle, as the case may be.

Chaussier designated the true condyles as epitrochlea for the internal condyle and epicondyle for the external condyle. Other authors have given the name epicondyle indiscrim-

¹ Read before the College of Physicians of Philadelphia, October 5, 1898.

inately to the internal and external condyles; thus Henle speaks of the epicondylus medialis and epicondylus lateralis. The designation of intra- and extracapsular fractures, and the avoidance of the word epicondyle entirely, will prevent all ambiguity and doubt as to what is meant.

The experiences and views of different surgeons as regards these injuries vary greatly. Sir Astley Cooper regarded fractures of the internal condyle as being frequent, while Malgaigne regarded them as being extremely rare, saying he never had seen them (*"Fractures and Dislocations,"* Philadelphia, 1859, p. 451). As to my own experience, extracapsular fracture of the external condyle I have never encountered; if it ever exists, it must be so rare as to be practically unknown. Fractures involving the capitellum are not particularly rare, but are comparatively heterodox in their character. They do not seem to possess the same clean-cut characteristics of the fractures involving the internal condyle. There are liable to be more than one fragment and even the head of the radius may be involved. The disability which they occasion is most apt to be a limiting of flexion and extension, and less frequently also of pronation and supination. It is comparatively rare that they produce an axial angular deformity, owing to pushing upward of the displaced fragment. Fractures of the internal condyle have been in my experience the most common of the fractures of the elbow. Extracapsular fracture of the internal condyle has been seldom met with, perhaps not more than twice. In these the lesion was well marked, and the diagnosis perfectly clear. Intracapsular fractures of the internal condyle have been frequent. While they sometimes cause restriction of flexion and extension, they not infrequently show a tendency to lateral deviation of the forearm, owing to the fragment being displaced upward, thereby causing the line of the joint to incline inward instead of—as it does normally—outward. This deformity is typical of the lesion, and follows with a fair amount of frequency these injuries. Who first described it I do not know, but it is to American surgeons principally,

and particularly those of our own city, that the profession owes the bulk of our knowledge concerning this peculiar deformity. John Syng Dorsey, in Vol. i of his "Elements of Surgery," published in Philadelphia in 1813, gives a most excellent illustration of it, and characterizes it as an "angular projection of the elbow outward."

It was the able, clear, and forcible writings of Dr. Oscar H. Allis, however, that caused the deformity to be known, recognized, and intelligently treated. His articles in the *Medical and Surgical Reporter*, July 1, 1876, the *Philadelphia Medical Times*, August 2, 1879, the *Annals of the Anatomical and Surgical Society of Brooklyn*, Vol. ii, August, 1880, and

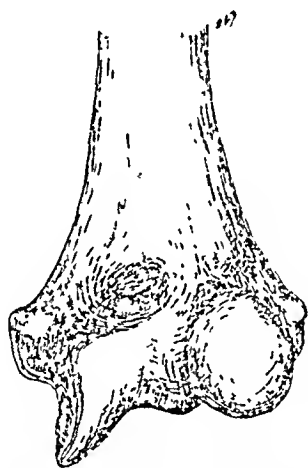


FIG. 1.—Normal humerus. Mutter Museum of the College of Physicians of Philadelphia.

the *Transactions of the Medical Society of Pennsylvania*, Vol. xiii, 1881, left comparatively little to be added to the subject. Later Mr. Nunn (*Clinical Society's Transactions*, 1892) also wrote about it.

The bony lesion, which is the cause of the deformity, will be readily appreciated by comparing Fig. 1, of a normal humerus, with Figs. 2 and 3. These show the internal condyle fractured and displaced upward, thus causing the joint surface to face inward instead of being nearly transverse, as seen in Fig. 1. The clinical appearance of the deformity is shown in Figs. 4, 6, and 7. In Fig. 4 both arms of the same

patient are shown. The sound arm has an outward angle of 173 degrees, while the deformed elbow has an inward angle of 160 degrees, thus making a departure of 27 degrees from the normal line. As evidence of the frequency of this deformity I have photographs of five cases, and have seen others, besides those cases of recent fracture in which the tendency to the production of this deformity was counteracted by treatment. In this country the name gunstock deformity has been almost universally used to describe the affection. It was, I believe, so named by Dr. Allis. Abroad

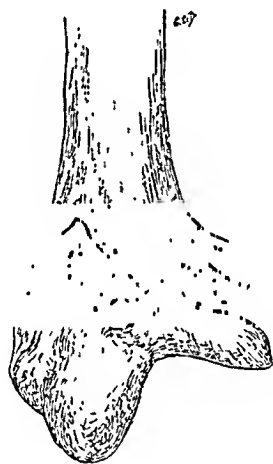


FIG. 2.—Anterior view of a right humerus, with displacement of the internal condyle upward from fracture. Mutter Museum of the College of Physicians of Philadelphia.

it is called cubitus varus, and this latter name is advocated by Dr. H. Rieffel in a very able article entitled “Etude sur le Cubitus varus et le Cubitus valgus,” in the *Revue d'Orthopédie*, July and November, 1897.

As regards the cause, it is usually due to a failure of the surgeon to recognize and prevent the displacement of the fragment during the first few weeks of the treatment of the fracture. The use of right-angled splints is particularly conducive to overlooking the deformity, because it is only visible when the arm is in an extended position. If it is particularly desired to use right-angled splints, the arm should be

extended at each change of the dressing or sufficiently frequently to assure oneself that no deformity is occurring. To guard against it Allis advised the treatment of these fractures in an extended position. In this he is supported by Rieffel and others. Personally, I have found that the completely extended position is so inconvenient and unsuitable for walking patients that I have employed an obtuse angular splint, as shown in Fig. 9. The tendency to angular deformity is overcome by placing a pad over the external condyle, and using an additional external lateral splint. These being fastened on by broad bands of adhesive plaster, which pre-

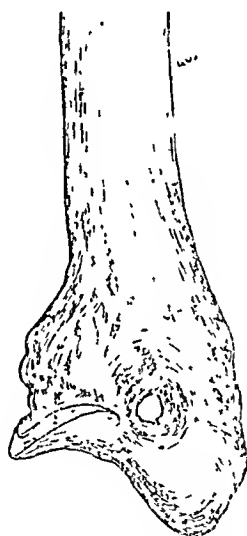


FIG. 3.—Posterior view of Fig. 2.

vent the splint from rotating, the elbow is pushed inward towards the ulnar side, while the bones of the forearm and arm are drawn outward, and so the tendency to deformity counteracted. The use of this external lateral splint and pad should be continued for fully five weeks and carefully examined twice weekly. The use of the straight splint even is not always efficacious, as is shown by two of the three cases here detailed having been treated by that means.

In my experience the union of the fragment to the shaft is very slow in taking place, therefore it is not desirable to assume that deformity will not occur if we are careful to

maintain a correct position for only two weeks; the position of the fragment is certainly capable of being modified for a much longer period of time. It is wise to remember that Allis insists that the use of a right-angled splint with the resultant pressure from the bandage directly favors the production of the deformity.

It is a peculiar fact that in these cases flexion and extension are usually unimpaired. One reason of this is that they commonly occur in children, and the surgeon, when consulted for the deformity, sees the case a long time after the original injury. It is customary not to treat the deformity after firm union has taken place. In our text-books no remedial measures are advised. The reason given is that the

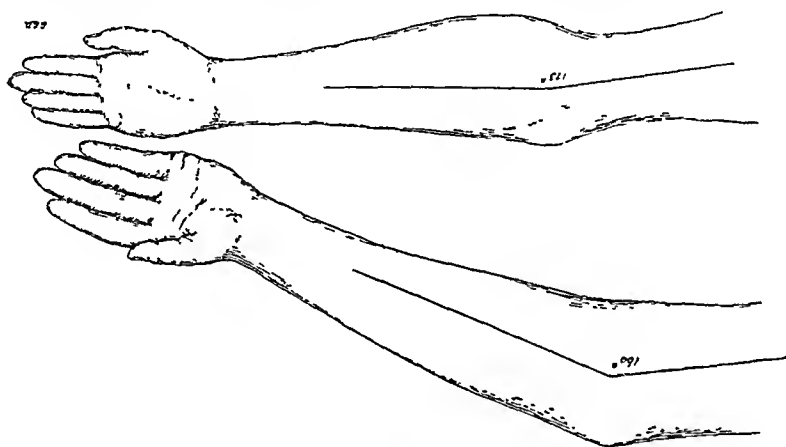


FIG. 4.—Deformity in Case I.

disability is not sufficient either for æsthetic or utilitarian purposes. In boys the question of appearance does not count for much, but in girls it certainly should have some weight. It is a deformity, and as such is not desirable.

As regards use it is by no means certain that no disability is experienced. It seems almost self-evident that there must be many instances in which the deformed arm could not perform certain acts so well as if it were straight. The departure from the normal line is so marked that even the length of the arm, as compared with its fellow, is considerably shortened, the patient cannot reach so far with it as with the uninjured one. The impairment of the carrying function has often

been brought to attention. If we were able to follow the patient in the performance of the various acts of life, I feel sure we would find on many occasions his use of the member to be more or less seriously limited, even though he himself might not be aware that such was the case. A myope only appreciates his disability after normal vision has been revealed to him by a concave glass. As the deformity can be much improved by a comparatively safe operation, I would urge that it be done in suitable cases. An osteotomy, even in the hands of the less skilful, is not apt to be followed by serious results. As the joint is not involved in the operation, limitation in the movements of the elbow is not liable to occur. I have operated three times for the correction of this deformity, twice in October, 1896, and again recently. The cases are as follows:

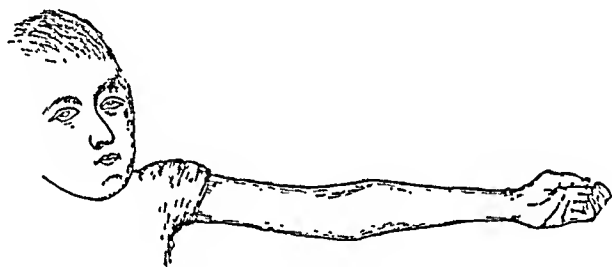


FIG. 5.—Result of operation in Case I.

CASE I.—A girl, aged eleven years. Six years previously she fell from a step and landed on her arm, sustaining a fracture of the internal condyle. It was treated on a straight splint for six weeks. The resultant deformity, with the sound arm for comparison, is shown in Fig. 4. The result of the osteotomy for correction is seen in Fig. 5, taken from a photograph.

CASE II was a boy, aged six years, who, two years previously, had sustained a fracture of the internal condyle from a fall. The angle formed by the deformity was about 155 degrees. At least 30 degrees from the normal direction. The illustration is from a photograph. The result of the operation was perfectly satisfactory, but he left the hospital before I secured a photograph of the arm in its corrected position.

CASE III was that of a boy, aged eight years. His internal condyle had been fractured by a fall two years before the time

of applying for treatment. His physician treated him with an almost straight splint at first, and then with a right-angled one. He stated that it was almost impossible to keep a splint on the boy, who was an exceptionally bad one. This case is shown in

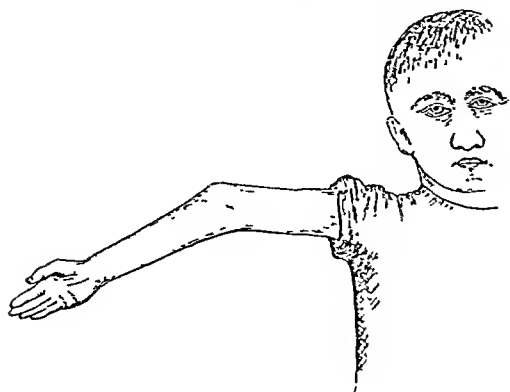


FIG. 6.—Deformity in Case II.

Fig. 7. The angle of deviation is exactly 39 degrees from the line of the humerus. Fig. 8 shows the results of operative correction.

The illustrations in these cases are taken direct from photographs. The fact that two of them were unsuccessful

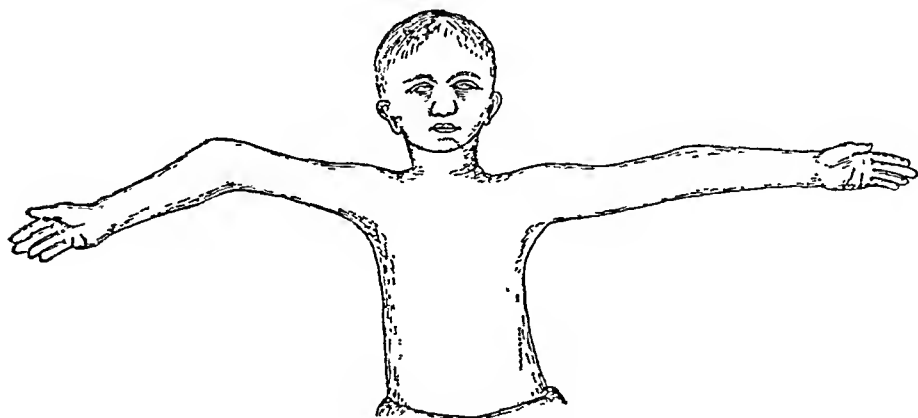


FIG. 7.—Deformity in Case III.

fully treated, at least in part, with a straight splint is significant. The reason lies, as stated by the physician of the last case, in the difficulty of keeping it properly applied. It is for this reason that it is advisable to fasten the splint firmly

to the arm by broad bands of adhesive plaster. This will prevent the splint from rotating around the arm, and is an absolute necessity in the use of splints. If desired, a roller bandage can be applied over the splint. All three of the cases had almost normal flexion and extension and rotation. This was likewise the case six to eight weeks after the performance of the operation. In two of the cases the electric drill was used to divide the bone, in the third a narrow osteotome was used. The section was made on the inside, so that the external fibres and periosteum were not disturbed, but remained intact, and thereby prevented displacement of the fragment. If the external side is divided by the osteotome the internal side is fractured in straightening, and therefore the bone is detached in almost its entire circumference,

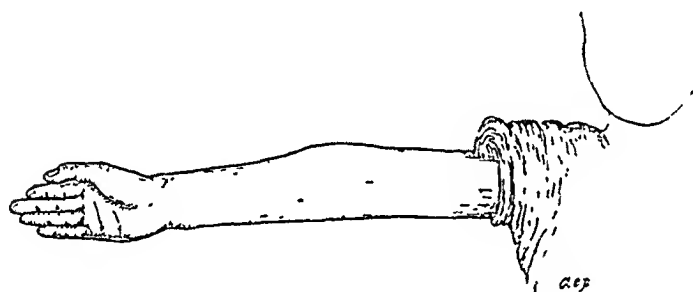


FIG. 8.—Result of operation in Case III.

a very undesirable thing. The technique is as follows: An incision is made two and a half centimetres (one inch) long, beginning a centimetre above the tip of the internal condyle and extending upward. This is deepened by blunt dissection until the bone is reached. The brachial artery and median nerve lie to the outer side, and the ulnar nerve to the inner or posterior side of the incision. The edges of the wound being held apart by two blunt hooks, a narrow osteotome is inserted and the bone divided to the extent desired, but not entirely across. The remaining portion of bone is then fractured or bent sufficiently to bring the arm into the desired position. A single catgut suture serves to hold the lips of the wound sufficiently together, and an aseptic dressing is applied. The arm, in an extended position, is then

enveloped in a plaster-of-Paris bandage from the fingers to the axilla, care being taken to hold it in its corrected position until the plaster is well set. Too much padding must not be used.

If desired, the dressing can be opened at the end of two weeks, and, being assured that everything is progressing favorably, reapplied, and allowed to remain six weeks from the date of operation. On its removal massage and passive motion will restore the mobility to the joint in a couple of weeks.

So far as I know Tilanus (*Deutsche Zeitschrift für orthopädische Chirurgie*, 1891, Vol. ii, p. 296) is the only one who has performed osteotomy for the correction of this deformity. He divided the bone on its external side, and had following

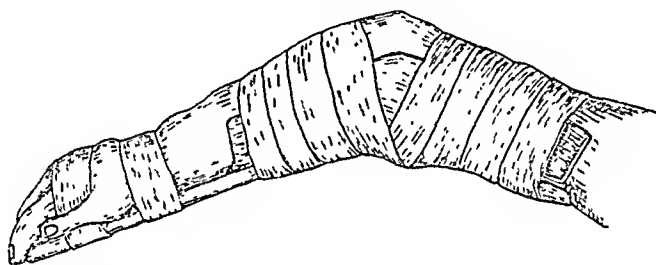


FIG. 9.—Fracture of internal condyle, with tendency to gun-stock deformity, treated with an anterior obtuse angular and external lateral splints.

a temporary paralysis of the musculo-spiral nerve. This is another reason for preferring internal division as herein advocated. The performance of osteotomy in these cases has recently been suggested as a proper mode of treatment for the relief of disability or deformity, by Dr. John B. Roberts, in the *Philadelphia Medical Journal* (September 24, 1898, p. 617).

As to whether the treatment in acute flexion of fractures, in which the tendency to this deformity exists, will prevent its occurrence, and give as good results as it appears to have done in other cases, remains to be demonstrated. The use of pins to hold the fragment in place, as suggested by Stanley Boyd ("System of Surgery," Treves, Vol. i, p. 822) and advocated by John B. Roberts, may be advisable in some

cases, but in my own cases a good result has been obtained by the splint dressing already described.

Gunstock deformity not only occurs from fracture, but it may be caused by rickets. Fig. 10 shows such a case. It is of a child, aged three and a half years. It had marked anterior curvature of both tibias, for which wedge-shaped

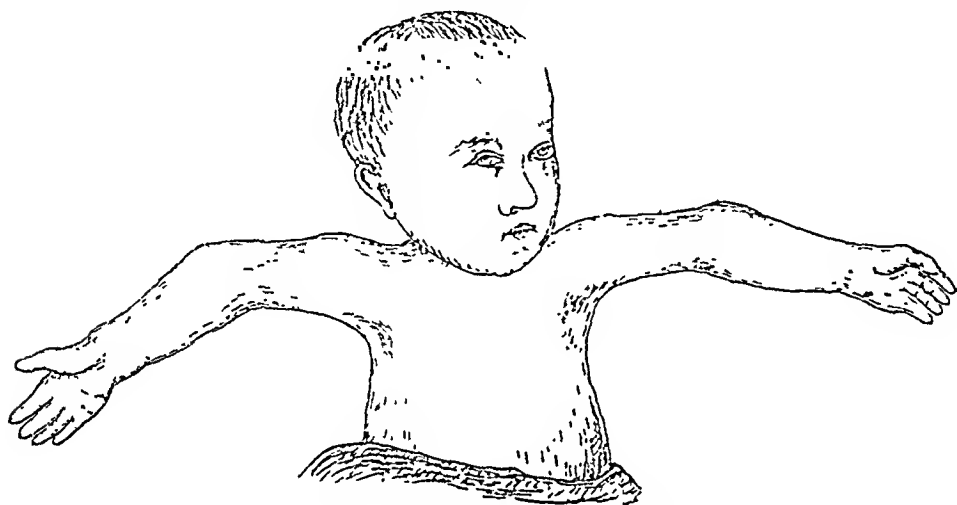


FIG. 10.—Gunstock deformity caused by Rickets.

resections were done. The angle formed by the right elbow was 165 degrees, while that of the left was somewhat less. I had thought of the possible advisability of operating on this case if the deformity persisted, but recently the child died at its home of diphtheria.

REMARKS ON THE RADICAL CURE OF HERNIA.¹

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THE retention of the abdominal contents depends upon the muscular and aponeurotic structures. The skin and the peritoneum are the natural coverings of a hernial protrusion, and have little or no value in preventing their occurrence, yet each is a factor in the result, which cannot be ignored.

One prolific cause of failure is suppuration in the wound and resulting formation of relatively weak scar-tissue in place of normal union, and for this the skin is largely responsible. At this time, when the material for the sutures, instruments, and dressings can be sterilized beyond a doubt, the fingers of the surgeon and the patient's skin are the recognized sources of danger.

By the constant use of instruments and protecting the fingers with gauze or a rubber finger-cot, or by the use of rubber gloves, in slight necessary fingering of the wound, hand infection can be reduced to a minimum, but by no means can the patient's skin be rendered reliably sterile. The white skin-germ has its normal habitat in the sebaceous follicles, and an occasional suppuration from this cause cannot be avoided.

A frank recognition of the impossibility of such efforts and the adoption of more careful handling of the skin to preserve the normal power of resistance, I believe, will lessen such unfortunate results.

The skin, as a rule, is over-prepared, the surgeon, humili-

¹ Read before the American Academy of Railway Surgeons, October 5, 1898.

ated by such suppuration, redoubles his efforts, and the skin suffers,—too often the prolonged poulticing with green soap, bichloride packs, scrubbing and shaving on the previous day, sends the patient to the operating-room with the wound-site covered with red points, where the white germ is already at work in the irritated skin.

From personal experience I can say that, since I abandoned these methods, two years ago, primary wound-healing has been of almost constant occurrence. The wound-site is prepared the morning of the operation by a careful scrubbing with soap and water, using a piece of gauze and not a stiff brush; it is then shaved and covered in the usual manner. The scrubbing is repeated on the operating-table, with the addition of turpentine, if the skin is very oily, and followed again by soap and water, and the wound-site is then hardened with alcohol.

In suturing the skin, careful avoidance of tension is of the utmost importance. The subcuticular suture gives a very beautiful scar, but if a stitch abscess is formed, the pus will run under the whole length of the wound, which may not be the case with the ordinary methods of closure.

The ingenuity wasted in dealing with the peritoneum has been enormous, the formation of buttresses or peculiar method of handling a membrane, which is notoriously impotent to aid in holding back the protrusion, is a waste of time. The only object in view is to prevent this membrane from insinuating itself in between the muscular and aponeurotic structures and preventing the union of the real retentive agents.

The late Greig Smith says, in speaking of the avoidance of hernia after operation, "that scar-tissue is always unreliable, and if possible should be protected by normal structures." The correct application of this principle is shown in the McBurney or the Kammerer incision for the removal of the appendix. In this connection Kocher has pointed out that incisions along natural lines or creases not only give better cosmetic results, but are also along lines less subject

to pressure with corresponding diminution of hernia. Bevans's incision for operation upon the gall-bladder is a fine example of the advantage to be derived from this method.

In the proper management of the muscular and aponeurotic structures lies the cure of the hernia, and every means of dividing the necessary scar-tissue into different planes, protecting each part by sound tissue, as in the Bassini operation for inguinal hernia, is of the utmost importance.

Great care should also be taken in the avoidance of tension in tying the sutures, and only enough to bring the parts in apposition should be inserted.

In the use of retractors the assistants should be cautioned to handle the tissues gently and avoid injurious traction.

Incisions posterior to the line of the colon in its fixed portion are less liable to hernia, as Theodore McGraw has pointed out, both because the muscular tissue is thicker, and also because the colon lying in front of the scar prevents the small bowel and omentum from wedging itself into the opening.

In operations for appendical abscess, if only drainage is instituted, the opening can often be placed well back with less liability of hernia, although the appendix may require removal later. If the appendix is removed in these large abscess cases, the patient is well rid of a serious problem, but quite likely will have a hernia to deal with later.

Inguinal Hernia.—Bassini's operation exhibits in a striking manner the correct application of the principles involved in all hernial operations, instead of a scar in one plane from within out, which was the weak point in previous operations, he divided the scar into two parts and protected each by normal tissue.

The internal oblique and transversalis muscles and fascia are sutured under the cord to the inner surface of Poupart's ligament, and this line of sutures is protected by turning Poupart's ligament back into its place over the cord, while the line of suture reuniting the divided fascia of the external

oblique is protected by the sound tissues drawn underneath. The resulting union being not only edge to edge but side to side, furnishing broad surfaces for union.

As pointed out by William B. Coley, one suture should be introduced above the new internal ring in the deep layer of sutures as well as those below; this limits the extent of the opening and prevents stretching above, under pressure.

Postempske modified Bassini's operation by bringing the cord directly through the external oblique, at the site of the internal ring. This has been followed by many operators. In my experience it has proved an objection, as I have seen a number of failures wherein the relapse occurred at this opening, and even when the internal ring is protected by the fascia of the external oblique, as in Bassini's method, the relapse seldom follows the cord but tends to bulge directly through, stretching and thinning the tissues over the internal ring.

Lucas Championnière has observed that nearly all operations for radical cure will show a moderate impulse on coughing, and that this is not an indication of impending relapse.

We have made the typical Bassini operation more than 100 times, and the results have, with few exceptions, been good. We have abandoned kangaroo tendon for catgut sterilized by the Boeckman dry heat method, and are perfectly satisfied with the results. Several years ago I performed the Halsted operation a number of times. It is a very good method and ranks next to the Bassini. The disadvantage is that the scar-tissue lies in a single line from within out. The mattress stitch brings broad surfaces into apposition, and the weak scar-tissue is protected by permanent buried sutures of silver wire acting as an internal splint. The results were good, but occasionally, even after months, tissue atrophy over a wire suture rendered its removal necessary.

The original McBurney operation, which sought to give a great mass of scar-tissue to protect the hernial opening,

has been abandoned by its distinguished originator, and justly so in non-strangulated cases, as it represents a transitional stage in the development of better methods; but I have occasionally found it very useful in gangrenous hernias, where it was necessary to use a drain. Ordinarily such a case is almost certain to relapse, but treated in this way a considerable percentage of permanent cures can be obtained, and at the same time good drainage is secured.

R. H. M. Dawbarn proposes and practises the burying of the testicle behind the muscles, thus leaving an unbroken abdominal wall. This procedure will not prove popular, but in cases complicated with undescended testicle it is a valuable suggestion, at once placing the testicle out of harm's way, and relieving the operator of an awkward factor in the cure.

Operation for the cure of relapsing hernia has been very troublesome; by the time you have raised the cord from its bed you justly wonder if there will be life enough to nourish the testicle. While on a recent visit to New York, through courtesy of William T. Bull, I saw him operate on several hernias in children. In one case he did not raise the cord from its bed at all, but picked the sac from it, tied and sutured the deeper muscles over the cord to the under surface of Poupart's ligament, and over this sutured the fascia of the external oblique in the usual manner of the Bassini operation. In operating on relapsing hernia this idea is most excellent, and saves much time and annoyance in raising the adherent cord from its bed.

The relapse, in my experience, is usually a direct protrusion and does not follow the cord, the coverings being thinned and stretched muscular and aponeurotic structures.

E. Wylles Andrews, in his modification of the Bassini operation, sutures the inner edge of the incised fascia of the external oblique with the internal oblique, transversalis, and Cooper's fascia below the cord to the under surface of Poupart's ligament, suturing the external edge of the flap over the cord to the surface of the external oblique muscle in an overlapping manner.

As there is a redundancy of tissue, this plan of suturing in relapsing hernia is an advantage, as it shortens the tissues. In this way I have quickly and satisfactorily operated upon four relapsing hernias. Dividing the external oblique fascia to a point above the internal ring and loosening the outer flap only, to expose the under surface of Poupart's. The peritoneal sac is encircled by a purse-string suture, and either cut away or reduced and the suture tied. All of the tissues, excepting the skin and superficial fascia, are sutured *over* the cord to the under surface of Poupart's, and the external flap of external oblique overlapped and held by an extra row of sutures.

The external oblique has a larger range of motion than the inner muscles, and may be said to act as a sheath for them. This allows of overlapping during the repair of hernial openings at almost any point in the abdominal wall, and greatly aids the strength of the union.

In both the inguinal and femoral operations the bladder may be drawn with the sac into the wound and injured. In one such case I incised the bladder freely before I discovered the accident. Since that time I have been on the watch for this complication, and have a number of times been compelled to carefully dissect the bladder free from the neck of the sac.

Femoral Hernia.—My experience in the radical cure of femoral hernia has been favorable, although, from the nature of the femoral canal and the character of its walls, permanent occlusion would seem to be a difficult matter. In small hernias I have been satisfied with a method employed by B. F. Curtis, consisting of three superimposed circular purse-string sutures of catgut.

The first at the internal femoral opening, the second one-third of an inch outside of this, and the third at the external surface of the canal. For some very large hernias the method is not suitable. For these cases I have divided the external face of the ring outward and upward, separating the iliac portion of the fascia lata from Poupart's, then passing

a series of mattress sutures through Poupart's ligament one inch back of its lower margin, and catching the pectineus fascia with the inner sutures and the iliac portion of the fascia lata with the outer sutures near its cut edge; drawing these sutures tight, slide the lower fascia under Poupart's ligament; the latter acts as a flap and can be sutured by its lower margin to the tissues below.

A. J. Ochsner lays great stress on removal of a part of the omentum in these hernias, whether adherent or not, as he believes that the omentum is the entering wedge, and, if sufficiently shortened, cannot in the future reach to the femoral opening.

One peculiarity of femoral hernia is the amount of fat lying external to the sac, and which by the constant congestion may develop a true lipoma.

In this region will occasionally be found small hernial openings through Poupart's ligament, in the vicinity of the femoral ring, but not through it. They greatly resemble the small ventral hernia in the linea alba above the umbilicus.

According to Sutton, such hernias are caused by a slight separation of the aponeurotic fibres through which a little fat tag escapes. The irritation favors a lipomatous condition, and by traction a peritoneal pouch is drawn through. Closure is readily effected by direct suture, as there is little tendency to relapse.

I have had no occasion to try the so-called inguinal operation for the cure of femoral hernia.

Umbilical Hernia.—This form of hernia has been the hardest to cure. Usually found in very corpulent people with small muscular development, the conditions are naturally unfavorable. The advice is usually given to cut back on each side to the recti muscles. In two of my earlier operations, in attempting to follow these instructions, I trimmed back each side several inches before finding muscle fibres, impossible to draw to the median line. In both of these cases I was compelled to suture the wound transversely, and, con-

trary to my expectation, the results were just as good as in the ordinary manner of suturing.

If the patient be laid upon the table and then requested to rise, the action of the recti will clearly show their position and indicate the feasibility of attempting to draw them together in the median line. In a few cases I have been able to do this, and by tier suturing had fine results. Should the distance be too great, I have again used the flap method with the utmost satisfaction. After freely removing the umbilicus and attached sac, I have cut the ring upward and downward an inch or more, and cleared the aponeurotic structures on each side for at least two inches.

Mattress sutures of silver wire are introduced an inch to an inch and a half from the margin of the aponeurosis on one side, and one-fourth of an inch from the margin on the opposite side; when these are tightened it draws one side beneath the other, the overlapping edge being sutured to the surface of the opposite aponeurosis. As no sacrifice of tissue has been made the overlapping is readily done. C. P. Noble uses a somewhat similar method in closing cœliotomy incisions.

In operation for umbilical and ventral hernia the suggestion of Joseph Ransohoff, that the incision be carried into the abdomen on either side of the umbilicus and sac, is a good one, as it allows the hernia to be drawn out and inspected from the inner side, and saves a tedious dissection.

The little ventral hernia above the umbilicus in the median line can be easily closed in a similar manner, and in eight cases, in the experience of the writer, has relieved chronic gastric pain of long standing.

Buried silver-wire sutures in the upper part of the abdomen have not given me the after-trouble which I referred to in speaking of their use in inguinal hernia; although I limit the use of non-absorbable sutures to large umbilical and ventral hernia, where tier sutures are clearly inapplicable.

Post-Operative Hernia.—From drainage and other causes these hernias cannot be avoided. If of small size tier su-

turing has given good results, but if of long standing and considerable size, with attenuated muscle at the margins, the flap or overflapping method as applied to femoral and umbilical hernia has proved quick and satisfactory. By this means the scar is divided into halves, and each line of sutures is protected by normal structures.

If the nature of the tissue is not good, buried mattress sutures of silver wire, applied after the method of William S. Halsted, give permanency to the closure.

Before operating upon large hernias, which are not readily reduced or only partly so, rest in bed with a limited diet for one or two weeks before operation is a good plan.

I have several times seen great distress and even dangerous symptoms follow the sudden return of the contents of large hernial sacs to the abdomen.

In old men, with large inguinal hernias, if the foot of the bed be raised for a week before and a week after the operation, the abdomen becomes accustomed to the presence of the hernial contents before its permanent reposition; and after operation less strain is brought to bear upon the sutures.

If there be enlarged prostate, castration can be done at the same time, and relieves the subsequent urinary straining, which not infrequently caused the hernia. In all operations upon this class of cases the removal of considerable quantities of omentum will lessen intra-abdominal tension.

Young males with phimosis should be circumcised, to prevent straining, before leaving the hospital; but on account of the proximity of the wound on the penis to the hernial wound and the increased restlessness of the child, it is not best to do them both at the same time.

We have kept the ordinary hernia cases in bed for three weeks, and have used no mechanical support afterwards.

With large umbilical and ventral hernias, four weeks in bed has been considered the shortest time advisable, and if the patient is very corpulent, an abdominal supporter has been advised for at least a year. During the past ten years a total of

243 cases have been operated upon by myself and my brother, C. H. Mayo. Previous to this time the operations made were entirely for the relief of strangulated hernias, and attempts at a radical cure were crude and unsatisfactory. Of these operations 180 were made at St. Mary's Hospital, Rochester, Minn.; eleven at the first State Hospital for the Insane, at St. Peter, Minn.; twenty at the second State Hospital for the Insane, at Rochester, Minn., and thirty-two cases outside of these institutions. This includes strangulated hernias in which radical cure operations were performed. In the first four years but thirty-nine cases were subjected to operation. Failures were numerous, and it was not until about six years ago that increased experience led to more systematic work.

Since January 1, 1893, an attempt has been made to find out the number of relapses, and while this could not be done with exactness, the sources of error are less in a fixed agricultural community than would be possible in a large city.

Of the 204 cases operated upon in this period 164 cases were inguinal, with five known relapses; sixteen cases femoral, with no known relapse; seven umbilical, with one known relapse; eight ventral, with no known relapse; nine post-operative, with one known relapse. In no case was the relapse complete.

In this series, one case of incarcerated femoral hernia in an insane patient, at the Rochester Hospital, died of external wound-infection. This may have been an autoinfection, as the patient would eat her fæces unless watched for months before the sudden incarceration demanded relief.

One case of inguinal hernia, at St. Mary's, died of broncho-pneumonia during the second week. This wound healed by primary union.

One case of inguinal hernia, at the St. Peter Asylum, died of uræmia from causes not connected with the operation after perfect healing of the wound. Otherwise, from these cases, there have been no deaths in non-gangrenous hernia.

I am under obligation to Dr. A. F. Kilbourne, superintendent, and to Dr. R. M. Phelps, assistant superintendent, of the Rochester State Hospital for the Insane, and to Dr. H. A. Tomlinson, superintendent of the St. Peter State Hospital for the Insane, for re-examination of the thirty-one cases operated upon in these two institutions, and in none of these was there a relapse.

PERMANENT DISLOCATION OF THE PATELLA.
THE REPORT OF A CASE OF TWENTY YEARS' DURATION, SUCCESSFULLY TREATED BY TRANSPLANTATION OF THE
PATELLA TENDONS, WITH THE TUBERCLE OF
THE TIBIA.

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THE following case is reported because of its rarity, and because of the nature and extent of the operations which were necessary to correct the deformity.

Cases of a simple dislocation of the patella, the so-called "slipping patella," or those in which the patella slips out and in with considerable ease and frequency, are not uncommon, and the treatment of this condition is so definite that any discussion of this part of the subject would consist largely of a repetition of that which has already been written.

Cases of permanent dislocation, or those in which the deformity has been present for a considerable length of time, and in which the dislocation cannot be reduced without operation, are, however, seldom met with, and this fact, together with the treatment which was necessary, seemed to give the case interest enough for reporting.

It is very instructive, also, in studying the broader subject of joint surgery to consider the extent of the operation that is possible and still preserve a functionally good knee-joint. In the more common operations upon the knee, performed, as they are, for removal or the treatment of active disease, extirpation of the disease is the main object, and the

function of the joint, other than its use for weight-bearing, is of secondary importance. If the disease is removed or arrested and the leg straightened, even though the joint be stiff, the result is considered (and justly so) to be satisfactory. In cases, however, similar to the one to be reported, the object is not only to remedy the undesirable condition, but also to leave the joint with as near the normal amount of motion as is possible, the perfection of the result being measured very largely by the freedom of movement.

A preliminary report of the following case was made at the meeting of the American Orthopædic Association, held in Buffalo in May, 1896, but it has not been published until now, in order that a sufficient length of time might elapse so that the ultimate result could be more fairly determined:

CASE.—M. W., a woman, thirty years of age, was first seen in February, 1895, and treatment was asked because of pain in the "small of the back," which had existed for some time, but which had increased so as to interfere with her occupation. She also had some trouble with the knees, and had walked peculiarly since she was ten years old. This latter trouble, while considered by the patient to be of secondary importance, was supposed to be due to the fact that at that age (ten years) she was obliged to run a sewing machine almost constantly. She is quite sure she was well before this, and that the knees have been in the present condition ever since.

On examination, the patient walked peculiarly and stood with both knees slightly flexed and resting against each other, the thighs being rotated inward. In this position the hips were thrown back and the lumbar spine arched more than normal, producing a well-marked lordosis. No disease of the spine could be made out, and it seemed probable that the pain in the back was the result of the muscular strain due to the peculiar attitude in standing or walking. The knees were freely movable both to active and passive motion, the only thing unusual being that, when sitting, voluntary extension of the leg, without inward rotation, was impossible, as was also complete extension either to active or passive movement. This latter restriction was apparently due to some change in the shape of the articular sur-

faces of the bones. Both patellæ were dislocated, and could be felt and seen on the outer aspect of the joint over the condyle of the femur. It was because of this, and the fact that the strong anterior thigh muscles were obliged to pull around the end of the femur instead of over it, that made horizontal extension of the knee without inward rotation impossible, and which made it necessary to rotate the thighs inward and brace the knees to-



FIG. 1 shows the position of the bones before the operation, with the patient standing.

gether for standing. The position with the knees slightly bent, as is necessary in standing when the legs are turned in and the knees braced together, in turn produced the lordosis, and this, by putting more strain upon the spinal muscles, caused the troublesome backache.

The correction of the position of the patellæ by any manipu-

lation was impossible, and feeling that this must be accomplished before the spinal symptoms would subside, an operation was advised.

The patient entered the Carney Hospital, and in March, 1895, the right knee was operated upon as follows:

Through an eight-inch incision, beginning above the knee



FIG. 2.—Position of the bones and the appearance of the knee with the leg flexed, before operation.

on the outside and extending downward across the knee to the inside, the capsule of the joint was exposed. Even with the skin removed the patella could not be brought up into its normal position, and a longitudinal incision three inches long was made through the outer part of the capsule. After this the dislocation could be corrected without difficulty, but because of the change

which had taken place in the shape of the ends of the bones, the tubercle of the tibia was so much farther to the outside than normal that, when the joint was flexed, the patella slipped out of place again. In order to obviate this, and to have the attachment of the patella tendon in the proper place, it was cut off and sewed to the periosteum and expanded tendon of the sartorius on the inner and anterior surface of the tibia. (Because of the twist which had taken place in the whole upper part of the tibia this sartorius attachment, instead of being on the side, was well in front.) The loose capsule on the inner side of the joint was next shortened up with quilted sutures, and for fear lest the strong thigh muscles should tear away the new attachment of the patella tendon before it should become firm, about three-fourths of the quadriceps extensor was divided just above the patella. The wound was then tightly closed, the skin being depended upon to close the gap (three-quarters of an inch broad) in the outer part of the joint capsule made necessary to draw the patella forward.

The recovery was uneventful, there was very little pain, and practically no elevation of temperature. The wound was healed in one week, and motions, which were not in the least restricted, were allowed at the end of one month. A leather knee-splint, to prevent any sudden violence and the possible tearing away of the newly attached tendon, was worn during a part of the time for a few months.

As soon as the patient was able to go about, even though one patella was in place and the action of the knee improved, the difficulty in completely extending the knee remained, so that the lordosis was not lessened. To correct this an osteotomy of the femur above the condyles was performed upon both legs and the limbs straightened. The convalescence from this operation was uneventful, and eight weeks from the time of its performance the left knee was operated upon to correct the position of the patella. The operation was similar to that which was used in the other joint, except that, instead of cutting off the patella tendon and reattaching it, the whole tubercle of the tibia was chiselled off and this nailed to a depression which was made on the inner side of the bone. The reason for this change in the procedure was that while the other knee had shown no signs of weakness, nevertheless, it was my feeling that a bony attachment would probably

be more secure. With this, of course, it was not necessary to cut away so much of the attachment of the quadriceps extensor above the patella.

Instead of the primary union, as was obtained in the other knee, the tendon and the piece of transplanted bone sloughed

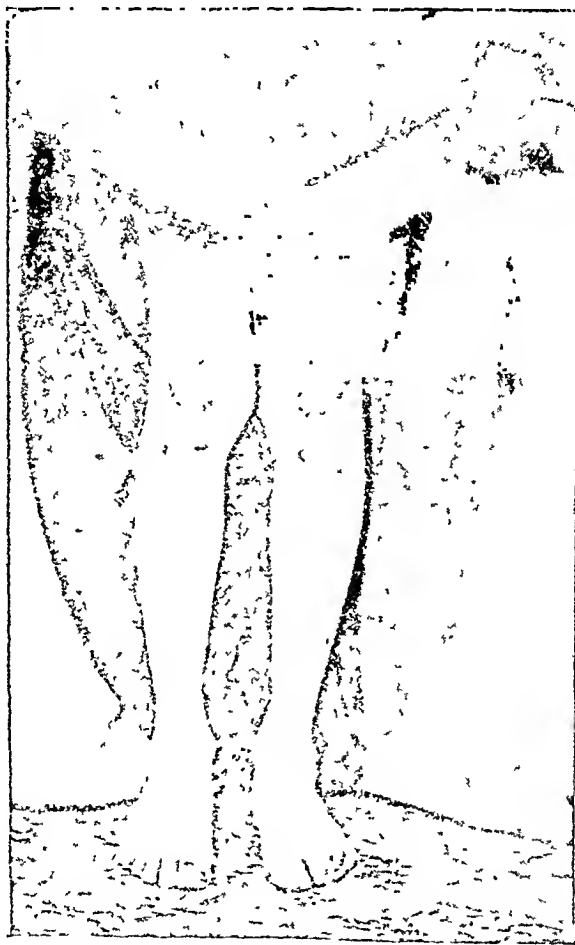


FIG. 3.—Showing the result with the patella in place; the skin-marks on the outer side of the leg indicate the place of the attachment of the patella-tendons before operation, while the marks on the inner side indicate the present attachment.

considerably, so that, instead of healing in one week, about three months were necessary before the wound was entirely closed. During much of this period the patient was able to be about, but the healing was not complete until then. The functional result

in this case is also not as good as in the right, and, while complete extension is possible, there is only about 70 degrees of motion in flexion.

Since the operation there has never been the slightest indication of the old pain in the back, the lordosis has been corrected, the gait is much improved, and, except for the limitation in flexion in the left knee, the patient is perfectly well, with the normal function of the joints. On walking or standing the inward rotation of the legs has disappeared, as is shown in the photograph (Fig. 3), and on sitting complete extension of the leg is easily performed entirely without the twist of the leg that developed with such movement before the operation. It is now two years since the last operation was performed, and during much of that time the patient has been at work, so that the knees have had a fair test, and with the increased use the legs have steadily grown stronger.

In reviewing this case, even though the right knee is the better of the two, the operation which was performed upon the other knee is the better, in my opinion. The detail in another case would be planned out more carefully, and in transplanting the piece of bone, instead of freeing the fragment entirely, it would be better to save the attachment of the periosteum as much as possible, and to swing the bone around without completely separating it. If this can be done, it seems probable that the sloughing need not occur.

FISTULOUS OPENING BETWEEN THE ILEUM AND THE BLADDER; OPERATION AND CURE.¹

BY HENRY O. MARCY, M.D.,

OF BOSTON.

MRS. L., aged forty years, was a strong, healthy girl. Menstruated at thirteen, regular until twenty-two. Married at twenty-one. Never pregnant. Menstruation irregular, at times wanting for several months. Consulted me because of sterility three years after marriage. A small movable uterus with a long, conical cervix. No evidence of ovarian disease. Never seriously ill until twenty-six years old, then following undue exercise in the country, was suddenly seized with very acute pain in the region of the left ovary. Diagnosis, acute peritonitis. She was under the care of Dr. E. W. Norwood, of Spencer, Massachusetts. In bed for some weeks; considered dangerously ill. About the end of the second week felt something give way in the abdomen. Soon after passed by the urethra a considerable quantity of thin yellowish matter, accompanied by the escape of a little gas. Made a slow and imperfect recovery. In Mexico the following winter; was distinctively worse, and in a number of instances passed a very dark-colored fluid from the urethra, associated with what was believed to be the minute seeds of certain fruits. Since this period has never menstruated. At times been confined in bed with attacks of acute cystitis. For the most part has been able to share in household and social duties, but never entirely free from pelvic discomfort. Oftentimes under the care of various physicians, bladder irrigated, etc. Not seldom gas has passed at micturition, and the patient firmly believed that there was an abdominal connection between the intestine and the bladder.

Admitted to hospital March 29, 1898. General vigor not

¹ Read at the New York State Medical Association, October 18, 1898.

seriously impaired. In good flesh; slightly anæmic. No other disease. Was just recovering from a somewhat acute attack of cystitis. Micturition rather frequent and painful. Urine in normal quantity and specific gravity, acid, slight trace of albumen, and distinctively tinged with bile-pigment. Pus-cells abundant. Minute fragments of muscle, bits of the hulls of oatmeal, and cellular shreds from the orange, starch cells, etc.

Following the eating of strawberries, a considerable number of the seeds escaped with the urine drawn by a catheter. No milk found in the urine following its high injection through a rectal tube. The uterus is small and movable, but to the left in the region of the ovary there is a slight enlargement, somewhat tender upon pressure.

Cystoscopic examination of the bladder showed the bladder wall of increased capillary vascularity, but otherwise without marked change, except at the fundus, where there was an irregular opening surrounded by a deeply injected area. I was enabled to carry a sound easily through the opening for an inch or more, thus establishing clearly the diagnosis of a vesico-intestinal fistula.

The presence of the biliary pigment, together with the incompleting digestion of the intestinal contents, indicated that the portion of the intestine involved was above the ileo-cæcal valve. After a consultation with Dr. William L. Baker and Dr. F. L. Thayer, of Newton, the family physician, I advised surgical interference.

Operation April 5, 1898, assisted by Dr. Thayer. The bladder, uterus, the left ovary, tube, and about six inches of the small intestine were fused in a common mass by vascular adhesions. These were separated with much difficulty. The left ovary and tube were removed; the ovary the size of a small egg, the tube distorted and evidently the primary seat of the disease, resulting in an abscess, which had opened, after the formation of adhesions, into the intestine and bladder.

The opening in the ileum was about one-third of an inch in diameter, and about eight inches from the ileo-cæcal juncture. The opening into the bladder was much smaller, perhaps half as large, of a somewhat valvular form, which explained the reason why the urine did not pass upward into the intestine. After refreshing the edges, I closed the openings independently

by double continuous tendon sutures. Over these I intrafolded the peritoneum by a single fine, continuous parallel tendon suture. Then I carefully closed the abraded peritoneal rents in a similar manner. Closed the abdominal wound by independent layers of sutures and sealed with iodoform collodion without drainage. The bladder was drained by a retention catheter for several days and occasionally washed out with boric acid solution. The patient made a comparatively easy recovery, the urine for the most part rapidly cleaning up, and no further gas was passed by the urethra.

October 16 examined patient. She passed the summer at the sea-side; is greatly improved, although her general health is not entirely restored. Slight cystitis remains.

In this connection a previously reported case is worthy of mention. A healthy child of eighteen months was taken acutely ill, temperature soon reaching 105° F. Developed a small tumor in the right iliac region, probably appendical. Tender to the touch, skin slightly reddened and infiltrated. This opened spontaneously, followed by a free escape of fæces and urine. A little later, I made a free dissection, separated numerous adhesions which had fixed the intestine and bladder to the surrounding parts. Closed two openings in the intestine which admitted the end of the finger, and closed the opening in the fundus of the bladder, about one-third of an inch in diameter; using tendon sutures in the manner already described. The patient made a rapid recovery, and is now a healthy, well-grown girl.

The subject is interesting, especially because of its rarity and oftentimes difficulty of diagnosis. Openings from the bladder into the rectum are not very uncommon. An interesting symptom is the passage of gas by the urethra, pneumaturia.¹ It is well to remember that this may occur from mechanical reasons, and also because of some organism in the bladder which produces gas. Pelvic fistula may occur from a variety of pathologic conditions, as, for example, cancer,

¹ See an interesting article by Drs. Kelly and MacCallum, of Baltimore, *Journal of the American Medical Association*, August 20, 1898.

abscesses of the reproductive organs in women, calculi, urethral stricture, prostatic disease, etc., in the male.

Anatomically, there appears to be no especial reason why the small intestine may not be involved, as the seat of a fistulous tract. But after a somewhat careful research of the literature of the subject, I have failed to find a single case where operative measures have been attempted.

In the paper above referred to, Dr. Kelly reports a case of fistulous opening between the sigmoid flexure of the colon and the left vertex of the bladder. After a careful dissection, the vesical orifice was closed by means of interrupted catgut sutures; the opening into the bowel by interrupted silk sutures, the patient making a perfect recovery. The second case, where the opening was between the rectum and the base of the bladder, the openings were closed by two rows of "mattress" sutures. The patient did well for twenty-four hours, but her weakness was such that she succumbed. There was no peritonitis or hæmorrhage. Six years before she had been operated on for a tubo-ovarian cyst. At the last meeting of the American Surgical Association, Dr. W. W. Keen, of Philadelphia, read a paper entitled "Case of Appendicitis in which the Appendix became Permanently Soldered to the Bladder, producing a Fæcal-Urinary Fistula." He had been twice operated upon, the last operation for the purpose of making an artificial anus. At a third operation it was found that a very long appendix dipped into the pelvis, the tip lying just behind the prostate and solidly incorporated into the wall of the bladder. This was separated from the attachment, and the distal end of the appendix, covered by a fold of peritoneum, was allowed to remain. The patient subsequently died, after leaving the hospital, following a fourth operation for the closure of the artificial anus. A mesenteric band had produced intestinal obstruction.

THE ANATOMY AND SURGERY OF THE FRONTAL SINUS AND ANTERIOR ETHMOIDAL CELLS.

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(Continued from page 765, December, 1898.)

PART II.

THE ETIOLOGY, PATHOLOGY, AND TREATMENT OF SUPPURATION IN THE FRONTAL SINUS, TOGETHER WITH THE NECESSARY CONSIDERATION OF DISEASE OF THE ANTERIOR ETHMOIDAL CELLS.

HISTORICAL.

FRONTAL sinus disease has been recognized for many years, but, until recent times, only certain manifestations, now known to accompany a comparatively small number of these affections, were looked for, and properly interpreted. These symptoms are now known to be late developments in the history of these cases and include the presence of a tumor or fistulæ in the vicinity of the frontal sinus or inner wall of the orbital fossa.

During the last century such cases had been diagnosed and operated upon by one of the so-called external operations.

In 1839, Dezeimeris published an exhaustive treatise, as far as concerned the knowledge of that time. In 1859, Bouyer published the results of his anatomical and pathological research, and more recently (1872) we have the re-

sults of Steiner's investigations concerning the anatomy and development of the frontal sinus.

The most exhaustive work, however, on the anatomy and pathology of the nasal cavity and its accessory sinuses has been carried out by Zuckerkandl. From a descriptive point of view this work has never been equalled, but numerous practical anatomical variations and particularly relations have been published by clinical observers.

One of the modern operators was Ogston (1884), and his operation is still followed by certain surgeons. In recent years, frontal surgery has been developed by Lichtwitz, Luc, Schaeffer, Winckler, Nebinger, Jansen, Kuhnt, and others, and pathological researches particularly by Weichselbaum and Fränkel.

Etiology.—It is often a difficult matter to trace the cause of suppuration in any given case, but, nevertheless, there are certain factors which predispose or give rise to this condition. In the first place, most sinus affections are consequent on *infection* from some source or other. We know that different pathogenic bacteria may give rise to inflammatory processes on mucous membranes, and we find also that the same bacteria may exist in sinuses without causing any symptoms or changes whatever. The mere invasion of the sinus by some bacteria is sufficient to give rise to inflammation; in other instances, other factors play a more or less important rôle. For example:

Trauma.—Fractures of the frontal bone, involving the sinus, are not uncommonly followed by suppuration within the sinus. Tissues are bruised and may necrose. There has been an escape of blood into the sinus which may clot and obstruct the ostium, or the fracture may be such as to interfere with its escape, and finally these changes furnish a good nidus for the growth of bacteria, already present within the sinus, or introduced at the time of injury. If there is neither infection nor obstruction, such an injury will give rise to no trouble. If the obstruction persists, a chronic discharging fistula will result.

Injury by bullets and various weapons may give a similar result. Trauma may follow the careless use of instruments in the anterior ethmoid cells near the ostium frontale, and cause an inflammatory process to extend to the sinus.

Foreign bodies in the sinus, such as parasites, have been reported as causing frontal empyema.

Mechanical obstruction, without infection, gives rise to the condition known as mucocele. This may persist for years without much discomfort to the patient, but it may become infected at any moment with complete change of the clinical picture.

On the other hand, obstructions may be of inflammatory origin, as evidenced by the development of hypertrophies and polypi. Inflammatory processes accompanied by or resulting in obstruction become acute, and must soon terminate in one of several ways, to be considered later.

Most cases of frontal suppuration are not accompanied by complete stenosis of the ostium frontale, although the ostium may be somewhat narrowed, but owe their origin and chronicity to certain bacteriological invasions, which give rise to pathological changes in the lining walls of the sinus. When deeply seated nothing but radical methods can prevent a continuation of the suppuration. These cases are said to be of infective or inflammatory origin.

Inflammatory Cases.—Bacteriological investigations have thrown much light on the causation and frequency of sinus affections, as well as their relation to the various infectious diseases. Inflammation in the sinus may follow: (1) Extension from neighboring foci of inflammation, particularly the nasal cavity. (2) They may be primarily involved in a general systemic infection. In these cases, whatever germ is causing trouble elsewhere, may also be found in the sinus as demonstrated by Weichselbaum and E. Fränkel.

(1) *Extension of Inflammation.*—It is undoubtedly true that many cases of frontal inflammation owe their origin to the extension of a process primary in the nasal cavity. They may arise almost simultaneously or may follow the nasal dis-

turbance a week or more later. A common history is to learn that the patient has just recovered from an acute coryza and now complains of frontal pain, etc., while the nasal examination is negative. Most of these cases recover spontaneously, but they are of common occurrence. Autopsies prove these statements, and Turcsa offers a clinical case in evidence, where the patient had a frontal fistula, in which he observed that there was an acute exacerbation of the symptoms with every attack of coryza. The position of the sinus as a whole, and the location of its ostium, expose it less to nasal extension than that of the other accessory cavities, and these conditions tend to favor an early resolution.

Nasal obstructions and inflammations in connection with hypertrophies render the sinus liable to invasion. These cases may be of acute origin, or may develop slowly without subjective symptoms, and be discovered only after *nasal* causes for suppuration have been eliminated.

Caries of the frontal or ethmoid bones may involve the sinus according to their proximity.

(2) *General Systemic Infection*.—That sinus affections accompany or follow acute infection or suppurative diseases with any degree of frequency is a comparatively recent discovery, but this conclusion is demonstrated by recent bacteriological and pathological examinations at autopsy. In a series of 146 autopsies by E. Fränkel, sixty-three cases gave evidence of an acute or subacute affection in one or more of the accessory nasal cavities. The frontal sinus, however, was much less frequently involved than the other sinuses, the antrum of Highmore predominating in by far the larger proportion. Weichselbaum was one of the earliest to demonstrate this association of sinus infection with acute disease. Recent investigations show that diphtheria is commonly associated with acute involvement of the sinuses, and that these cavities may contain the Klebs-Löffler bacillus after its disappearance from the nasal cavity and pharynx.

Children are more subject to acute suppuration than adults, the reason of which is readily explained by the fre-

quency of the acute infectious diseases peculiar to childhood. An enumeration, simply, of these causes is sufficient,—diphtheria, scarlet fever, measles.

In the adult acute or chronic diseases of the sinuses have been traced to the following causes: Pneumonia, influenza, erysipelas, cerebro-spinal meningitis, peritonitis, typhoid fever, variola.

Tuberculosis.—No evidence has been obtained to show that tubercular infection is ever primary in the frontal sinus, and there are but few recorded cases where it has extended to this sinus from neighboring foci.

Syphilis.—Syphilitic affections of the nasal cavity are common, and the amount of destruction often extensive. These processes often extend in any direction, irrespective of the tissue which they meet, and thus invade the sinuses, give rise to deep-seated pathological processes of the soft parts, as well as to caries and necrosis of the bony walls.

Many of these cases recover under the influence of anti-syphilitic treatment, but others remain unbenefited. The reason of this is due to the depth of the destructive processes and the usual mixed infection rendered possible by the syphilitic process, to which must be added mechanical obstructions to the removal of the exudate. These cases have a syphilitic origin, but their continuation and obstinacy under rigorous anti-syphilitic treatment are due to secondary complications.

The common pathogenic bacteria found in the frontal sinus are pneumococcus lanceolatus (Fränkel), staphylococcus pyogenes aureus, staphylococcus pyogenes albus, and streptococcus pyogenes. Other bacteria of rare occurrence are bacillus influenza, tubercle bacilli, typhoid bacillus, and bacterium coli commune.

New Growths.—Primary benignant or malignant tumors of the sinus are very rare, but extension of malignant disease into the sinus is not uncommon. That new growths of any sort may sooner or later give rise to frontal sinus inflammation is obvious. They tend to obliterate the cavity of the

sinus, obstruct its ostium, and in time become infected, thus giving rise to inflammatory complications.

Frequency.—The frequency of frontal sinus suppuration is impossible to determine. Most acute cases pass unobserved, and resolve spontaneously. Mild chronic cases may fail to give rise to symptoms of sufficient annoyance to the patient to cause him to seek medical advice. Many cases are obscured by other causes of nasal suppuration.

E. Fränkel's figures are interesting as showing that mild or even severe acute cases of accessory sinus disease are common complications in acute disease, but that the frontal sinus escapes far more frequently than the antrum or sphenoidal sinus. In a series of 146 autopsies, sixty-three had one or more sinuses affected, but only five were frontal, none of which were suspected during life. None of these frontal cases were isolated, but were associated with inflammation of some other sinus.

In fifty autopsies taken at random, Engelmann found three cases.

Pathological processes were discovered in the sinuses which served as a basis for the investigations described in Part I, but owing to the nature of the material (dissecting room) many changes could not be recognized, hence no reliable data could be obtained.

The frequency of frontal sinus fistulæ occurring in the eye clinics of Vienna has been figured as one in 9000 eye cases, in Berlin as one in 18,000.

Pathology.—The inflammatory pathological changes found in the frontal sinus are those peculiar to mucous membranes in general, but certain variations and complications may arise on account of the fixed walls and small ostium of the sinus. Inflammation of mucous membranes does not differ in essential characteristics from inflammation elsewhere. In addition to the ordinary products of exudation we may have mucus and columnar epithelium, often ciliated. Nevertheless, the nomenclature and classifications of inflammatory processes are very confusing and inconsistent. Dif-

ferent names are given to the same pathological process, depending upon the different appearances of the exudate and the nature of the infection, as well as whether the ostium is patent or not.

It is found that the same source of infection, under different circumstances, may cause but slight disturbance, or, under altered conditions, may give rise to the most destructive processes or to various grades of disturbance between these two extremes. The same organism may appear in both cases even in pure culture. Mixed infection may complicate the process with consequent variations in different directions. The exudate in acute processes will vary according to the severity of the process and at different times in its course, but the changes in the membrane itself are such as to characterize the disturbance as acute or of short duration. The exudate in long-continued or chronic cases may offer nothing to distinguish it from the exudate of acute cases, yet the mucous membrane, meanwhile, has undergone alterations which are more or less permanent and mark a distinct line of difference.

The inflammation of the frontal sinus mucous membrane will be considered under the following groups:

(1) Acute inflammation, characterized particularly by serous infiltration (œdema). (*a*) Exudative,—serous, fibrinous, seropurulent, and purulent. (*b*) Diphtheritic.

(2) Chronic inflammation, characterized particularly by connective-tissue formation. An exudate is always present, which may be identical with that seen in acute processes; meanwhile certain more or less permanent changes are undergone by the mucous membrane which alter its general character: (*a*) Scar-tissue or fibrous-tissue formation. (*b*) Hypertrophies and polypi may develop. (*c*) Cysts may appear. (*d*) Osteomata may be formed.

(3) Tuberculosis.

(4) Syphilis.

(1) Acute inflammatory processes are characterized by the pouring out of a varying amount of serum into the sub-

mucous connective-tissue layer (inflammatory œdema). In the early stages there is no exudate on the surface of the mucous membrane. In addition to the serum leucocytes infiltrate this tissue, which begins to swell rapidly and assume a reddish color, on account of the dilated capillaries. As yet the epithelial lining remains intact, and no exudate has reached its surface. The swollen mucous membrane obliterates the angles and borders of the sinus, and where the sinus is small and the œdema extensive, the sinus cavity may be completely filled. This is the period of congestion, during which there is no discharge into the nasal cavity. Sooner or later some of the serum, together with some leucocytes, escapes through the epithelial layer into the sinus. The serum, leucocytes, a few epithelial cells which may be thrown off the surface, together with a certain number of bacteria, go to make up the serum type of exudation. There is always a certain admixture of mucus in all instances so long as any mucous membrane remains.

If the ostium frontale is obstructed by the œdematous swelling or from any other cause, the exudate cannot escape, but accumulates under pressure, with a corresponding amount of pain which persists until this tension is relieved. As the inflammation advances, capillary hæmorrhages frequently occur, the round-cell infiltration is more marked in the vicinity of the glands, and there may be a slight amount of epithelial exfoliation.

The character of the exudate may vary and become more tenacious and sticky rather than watery. This is due to the coagulation of fibrin derived from the blood, and we have the so-called fibrinous type of exudation, but the condition of the mucous membrane remains unaltered. The amount of œdema has now probably reached its maximum, more cells are poured out into the serous exudate, which becomes more turbid and may be called seropurulent.

By this time several changes may have taken place. Either the exudate has appeared in the nasal cavity through an ostium which was never obstructed or the ostium has

become patent, whereby there has been much relief from the acuteness of the subjective symptoms, or, on the other hand, there is still obstruction and the symptoms have not abated.

In the first instance, simple, non-obstructive, the pathological changes may advance no further, the serous infiltration becomes absorbed or exuded, the round cells disappear, the exudate remains seropurulent for a short while, gradually decreases, and perfect resolution takes place. This is the history of simple acute cases, where all the parts are restored to normal in the course of ten to fourteen days.

The acute process may be more intense as manifested by the exudate, which contains a larger proportion of leucocytes and is called purulent. The exudate is now made up of a large percentage of pus-cells, often many red blood-globules, bacteria, exfoliated cylindrical ciliated epithelium, with more or less serum and mucus, and is alkaline in reaction. Even now, if the pus can escape, resolution may be complete, and all the symptoms disappear, for the changes in the mucous membrane have not materially changed. There has probably been an increase of the round-cell infiltration, more superficial desquamation, and hæmorrhagic pigmentation, but these are not necessarily permanent changes. If resolution should fail, and the exudation persist with free exit, the pathological process may change its nature, may give rise to permanent alterations, and thus become *chronic*.

If the ostium still remains obstructed, our condition is that of an *abscess in a bony cavity*, and nature will endeavor to provide an avenue of escape for its contents, if not anticipated by surgical intervention. Meanwhile, increased tension aggravates the symptoms, the mucous membrane becomes more infiltrated, more hæmorrhagic, and the superficial desquamation more extensive. The round-cell infiltration reaches the deeper layers, and finally the periosteum, and then the bony wall itself. The pressure and infiltration give rise to necrosis of the soft parts, an ulceration forms, followed by caries in some portion of the sinus wall. The moment that pus escapes from the sinus there is relief from

pain. Any wall of the sinus may thus become perforated, but the thin inferior wall is the commoner site, and the clinical picture will vary according to the exact point of perforation. If the point of perforation is well towards the front of this surface and near the inner angle of the orbit, as is usually the case, there will be an abscess form just under the skin, which is commonly punctured, or may be allowed to take its own course and rupture later. The swelling subsides and a fistula remains, which may continue to discharge pus indefinitely. If the perforation is towards the posterior part of the inferior surface, the pus will enter the orbit, giving rise to a secondary orbital abscess.

Although there is no direct evidence, there would seem to the writer to be every reason for believing that perforation frequently takes place in the nasal portion of the floor of the sinus, perhaps oftener than through its orbital portion. The reasons for this supposition are both anatomical and clinical.

In the first place, the cell walls of the ethmoid bone which complete the closure of the hiatus frontalis are thinner than the orbital portion of the floor of the sinus, and, other things being equal, ought to yield to pressure first. Again, it is becoming more and more evident that empyema of the frontal sinus is very often, if not almost always, associated with suppuration in some of the anterior ethmoidal cells. Again, the history of many acute cases of frontal suppuration is that of a sudden gush of pus from the corresponding nostril followed by relief from pain and eventual recovery or persistent discharge into the nose. This discharge may have made its exit either through an ostium which has become patent again or through a perforation in the nasal portion of the sinus floor. No one can say definitely what has happened. The prognosis in cases of nasal perforation ought to be better than where an external fistula is formed, for the latter is frequently associated with nasal occlusion of the sinus, and can be relieved only by operation.

Perforation of the posterior wall is not common, and

naturally is almost always fatal, in consequence of an acute meningitis or less frequently a frontal abscess.

Perforation of the anterior wall is most unusual, on account of its thickness. It happened in Warren's case, and gave rise to a pneumatocele. (Plate 85.)

As a rule, the interfrontal septum remains intact.

Resolution rarely follows these very intense acute inflammations. The destructive processes are often extensive, and the delay has been so long that the lymph-channels and blood-vessels and glands cannot remove the dense infiltration of round cells and other products of exudation. There is a proliferation of connective-tissue cells rich in nuclei, the mucous membrane remains thickened, and the exudative process continues, and we have a beginning process, without a marked dividing line, which we call a *chronic inflammation*.

Hence, in the exudative type of acute inflammation we have a process characterized by serous and round-cell infiltration, accompanied by various forms of exudate, without marked destruction of the epithelial layer. It may be followed by resolution or become chronic.

(b) *Diphtheritic Inflammation*.—Another type of acute inflammation (misleading on account of its name, in that it has nothing to do with the infectious disease) is diphtheritic inflammation. It is characterized at the outset by a destructive process whereby an exudate forms on an ulcerated surface, which cannot be removed intact without tearing the mucous membrane itself. It is a necrosis of the mucous membrane surrounded by an extensive round-cell infiltration.

It may occur on any mucous membrane, but must be extremely rare in the frontal sinus.

(2) *Chronic Inflammation*.—There is no definite dividing line between acute and chronic inflammation; the latter is usually preceded by a longer or shorter period of the former and the transition from one to the other is gradual. *The characteristic feature of the chronic process is the formation of fibrous connective tissue, which is permanent.* The membrane

itself may undergo further changes, characteristic only of the chronic process, but the exudate may correspond precisely with that of the acute process, with the difference that a purulent discharge is commoner in cases of long standing. As a further complication, an acute exacerbation may supervene at any time on an old process, whereby the appearance of both the membrane and the exudate may become greatly altered.

At the beginning of the chronic process the mucous membrane is still œdematous, but the round-cell infiltration predominates. The tissue is very vascular and succulent, and there is a great excess of nuclei. These proliferation cells become spindle-shaped and develop into fibrous connective-tissue cells, also known as scar-tissue.

In appearance the membrane is thickened, pale, and translucent, and its surface somewhat irregular in consequence of the contraction of the fibrous tissue at various points. The thickening of the membrane tends to obliterate the sharp angles and borders of the sinus, and reduce the size of its cavity. On section, the cellular infiltration is particularly emphasized in the vicinity of the glands and nearer the epithelial layer than the periosteum. The older the process, the deeper the infiltration, and the greater the loss of epithelium, which may be slight at first. Excoriations, therefore, are late developments as a rule. The exudation at this early state is usually seropurulent, made somewhat tenacious by the addition of mucus. This condition may last for months with no discomfort other than the constant presence of an annoying discharge from the nasal cavity.

These are the mild chronic cases, and are often amenable to simple therapeutic measures, if the ostium frontale is sufficiently patent.

Sooner or later, in all chronic cases, certain secondary changes take place in the mucous membrane, consequent on the contraction of the fibrous tissue and deeper extension of the infiltration.

These changes (already mentioned) are: (a) Increase of

fibrous tissue with general hypertrophy; (b) cyst formation; (c) polypi and local hypertrophies; (d) osteomata.

(a) The hypertrophy, due directly to increase of fibrous tissue, has been sufficiently considered, as well as its effects in multiplying the thickness of the mucous membrane. Its hinderance to the successful relief of empyema will be considered under therapeutics.

(b) Cysts are commonly seen in the antrum of Highmore, but are much less common in the frontal sinus, as a result of chronic inflammation. They owe their origin to an obstruction of the ducts of the glands of the mucous membrane from the pressure of round-cell infiltration, or the contraction of the scar-tissue, whereby the glandular secretion accumulates and forms a cyst. Microscopic cysts are probably present in most chronic cases, but it is unusual to find them much larger than a pea. They may occur on any of the sinus walls, and are invariably multiple.

The smaller cysts are lined with ciliated epithelium, but the larger ones are lined in part with squamous cells. The examination of the contents of cysts may reveal the presence of pus, epithelial cells, granules, cholesterin, fat, mucus, and albumen.

Another variety of cysts is formed by dilated lymph-channels. These are very unusual formations, and are apt to be solitary and of comparatively large size. They are filled with serum and lined with endothelium.

Instead of gland-dilatation with cyst-formation the contracting scar-tissue may obliterate the entire gland. This always takes place more or less extensively in prolonged, deep-seated processes.

(c) *Hypertrophies and Polypi*.—Small irregular prominences on the surface of a chronically inflamed mucous membrane are of common occurrence. They give a granular appearance to the surface, and are pale and translucent.

They are due to slight myxomatous growths, on the one hand, and made more prominent by depressions from fibrous contractions, on the other hand. The mucous membrane is

usually intact over their surface, but here and there small excoriations may be evident. This irregularity of the surface favors the retention of exudation, and hinders the action of therapeutic agents.

Polypi differ from these myxomatous hypertrophies only in degree. They may be single or more commonly multiple, and fill up the greater part of the cavity of the sinus. Their bases may be broad, but in most instances they are constricted. These polypi differ in no respect from polypi which may develop on any mucous membrane.

They are far less common than cysts in the frontal sinus, and they rarely develop to be of sufficient size even to fill the sinus. In structure, they consist of a wide-meshed reticulated framework, containing serum and myxomatous tissue and a few wide, thin-walled veins, all covered with ciliated columnar epithelium.

There is considerable discussion as to whether polypi are primary or secondary to inflammatory processes in the mucous membrane of the nares and accessory sinuses, but the evidence is decidedly in favor of the latter supposition, although in some instances polypi may be of primary origin.

(d) *Osteomata*.—As the inflammatory process reaches the deeper portions of the lining of the sinus the periosteum becomes infiltrated with serum and round cells. Resolution may follow if the process is arrested in time, otherwise the proliferation of cells and capillaries advances, new tissue is formed, and in due time inorganic salts are deposited, forming bone. Thus the general thickness of the sinus wall may be increased, but more commonly the new formation of bone appears as thin plates, free or attached to the walls, or as tubercles and spicules.

This bone-formation presupposes a deep-seated inflammatory process, amenable only to radical operative treatment.

At any time during the progress of chronic inflammation acute exacerbations may supervene, and this is commonly the case. The clinical symptoms are altered, the chronic pathological changes remain fixed, but the œdema and addi-

tional round-cell infiltration, which characterize acute processes, are added. The usual outcome is that the chronic process becomes deeper seated.

Chronic inflammatory processes, therefore, are manifested by a new formation of connective tissue, complicated by changes in the superficial or deeper layers of the lining membrane, and all of these changes may take place with a comparatively intact epithelial layer, or, in fewer instances, superficial or deep ulcerations may exist. The depth of the process and the inaccessibility of the part to ordinary therapeutic measures is sufficient explanation of the chronicity of these cases.

(3) *Tuberculosis*.—The characteristic appearances of tuberculosis are evident here as elsewhere on mucous membranes. The process is one of ulceration with connective-tissue proliferation, and generally extends into the sinus as a part of a local process elsewhere. (Further detail is unnecessary.) Tubercle bacilli have been found at autopsy in apparently normal sinuses in patients who have died of tuberculosis.

(4) *Syphilis*.—The manifestations of syphilis are common in the nasal cavity, whence they may extend to the accessory sinuses. The process is characterized by ulceration, with the possible destruction of all tissues, followed by extensive scar-formations.

The process may be so deep-seated and complicated by mixed infection that it may fail to yield to ordinary anti-syphilitic treatment. Involvement of the frontal sinus is commonly secondary to local syphilitic ulcerations.

New Growths.—In addition to the inflammatory processes in the frontal sinus, we have the consideration of new growths, which need but a passing mention.

Fibroma rare.

Cholesteatoma rare. First described by Virchow as a new growth. Cases reported also by Wotruba. Not to be confused with collections of epidermis, as observed in the mastoid antrum.

Malignant Tumors.—Sarcoma, carcinoma. These are the results of extension in most instances, and offer nothing particularly characteristic when they invade the sinus.

Symptoms.—All symptoms may be classified as *local* or *general*.

General symptoms are of secondary importance in sinus affections, except in certain acute cases, and in some of the complications arising therefrom; hence these general symptoms will be considered under local symptoms, as called for.

Local symptoms may be subjective or objective.

Subjective Symptoms.—*Pain.*—Pain is very characteristic of acute cases, and is often a symptom during the course of a chronic case. In acute cases, there are several causes which give rise to pain. The early pathological changes are followed by œdema of the mucous membrane, which consequently thickens so as to fill up more or less of the sinus, and even obliterate its cavity, if small. This œdema presses the nerve-endings on account of the resistant bony walls. This swelling may also occlude the ostium frontale with consequent retention of exudate, which tends to accumulate under pressure, and give rise to excruciating pain and secondary reflex symptoms.

A common history of the pain in these acute cases is as follows: Several days to two weeks after the cessation of an acute coryza the patient complains of pain in one or both frontal areas, which gradually increases in severity. It is worse when the head is lowered or after coughing, sneezing, blowing the nose, and any sudden movement. It is a constant ache without remission, but with occasional darting pains. Its severity increases slowly, and varies according to the degree of tension of the exudate or the amount of œdema, and may decrease slowly, but more commonly relief comes rather suddenly. This is due to the returning patency of the ostium and discharge of the exudate. Up to this moment there has been no nasal discharge, when suddenly there is a mucopurulent or purulent or even bloody discharge from the corresponding nostril. The pain now decreases rapidly, and

may cease to be a further element in the case, provided the outlet remains unobstructed. The sinus may rupture into the orbit, also, with relief. Internal medication with anti-neuralgics is of no avail in these cases. Photophobia and shedding of tears on the affected side not rarely accompany the pain of this stage.

On the other hand, many cases run a mild course throughout. In chronic cases, pain is more commonly a symptom of secondary importance; when present, it is due to the same causes, and is suggestive either of a simple retention or of an acute exacerbation of the inflammatory process. Most chronic cases complain of no pain, but rather of an occasional dull ache. Pain is referable to the frontal area, but when intense, it may radiate in any direction and resemble a neuralgia or migraine. In severe cases, it may be impossible to differentiate the pain accompanying frontal ethmoidal or antral inflammation.

Pain is frequently of such a nature as to be described as a headache, and is often accompanied by dizziness, with flashes of light before the eyes on coughing.

Tenderness.—Tenderness is a symptom of great value. In acute cases, it varies more or less with the severity of the pain.

In chronic cases it may be sufficiently acute to attract the attention of the patient, but very frequently it is too slight to be of annoyance, and is discovered only by the examiner. In all instances it conforms in area very closely to the frontal region. It is most marked, however, at the inner angle of the orbit, on the orbital portion of the floor of the sinus. The tender spot is internal to the supraorbital notch, which is a help in differentiating neuralgia.

Tenderness should be examined for, either by means of graduated pressure or percussion.

Altered Sense of Smell.—Patients may complain of loss of the sense of smell. This cannot be traced directly to the frontal inflammation, but is probably consequent on troubles in the nasal cavity itself.

Constitutional Symptoms.—During the course of acute cases there is more or less febrile disturbance. We may have chills with considerable rise of temperature lasting until the sinus begins to discharge its contents. These febrile disturbances need no further consideration.

In certain instances, the annoyance and worry of long-continued suppuration give rise to a chain of nervous phenomena, which, in time, may result in lowering the general condition of the patient. Most chronic cases, however, rarely complain of subjective symptoms.

Objective Symptoms.—(1) In nasal fossa. (2) Over frontal area and at internal orbital angle and in orbital fossa. (3) In cerebral fossa.

(1) *In Nasal Fossa.*—If the ostium frontale is occluded, as is common in acute cases, and an occasional complication of chronic cases, there may be no nasal symptoms whatever. In late stages of acute cases and in all chronic cases, there is to be observed one symptom which is the most important we possess as regards its diagnostic value. *This sign is the presence of pus in the nasal cavity, and is of conclusive evidence if its source can be traced to the frontal sinus.* Concerning the pus, there is nothing characteristic as regards its color, consistency, or odor. The amount of the discharge may suggest some accessory sinus affection and occasionally the degree of inflammation.

The patient complains of a more or less constant discharge of pus, sometimes very offensive, which appears at the anterior or posterior nares. It flows more constantly by day, and tends to accumulate at night while the patient is at rest, but in the morning there is an excess of crusts and pus, which necessitate cleansing the nose at once on rising. Most cases of frontal empyema have objective symptoms referable only to the nasal fossa.

The consideration of localizing the source of pus in the nasal fossa, the differentiation of sinus affections, the value to be attached to the presence of nasal polypi and hypertrophies, will be considered under diagnosis.

(2) Over frontal area and in orbital fossa.

Objective symptoms in this group are consequent on prolonged obstruction to the discharge of exudate from the sinus. They are manifested by (a) local signs of inflammation; (b) presence of a fistula; (c) presence of a tumor; (d) inflammation in the orbital fossa.

(a) In acute cases, where the obstruction persists, the tension increases and the pathological changes travel deeper. Sooner or later the upper eyelid becomes oedematous and slightly reddened. This swelling and redness extend towards the median line and up onto the frontal area, and their extent is limited only by the severity of the process. Pain and tenderness increase proportionally.

If the ostium becomes pervious before these changes have advanced too far, then resolution may supervene without further change, and the parts be restored to normal. It is unusual to get marked external signs followed by resolution, for the pathological process goes on to further destruction, unless arrested by surgical intervention.

In time an abscess forms, which discharges pus freely, and the swelling subsides and the subjective symptoms decrease. These changes may occupy several days, and be accompanied by considerable constitutional disturbances.

An examination of this opening with the probe shows that it communicates with the frontal sinus, which commonly remains occluded towards the nasal fossa. There may be no further subjective symptoms so long as this fistula remains patent.

(b) *Fistula*.—The presence of a fistula presupposes the history just mentioned, and indicates, besides, that there has been a necrosis of the sinus wall. Its presence simplifies the diagnosis of a suspected frontal empyema.

Its location is comparatively constant at the upper internal angle of the orbit, internal and posterior to the supra-orbital notch. It is rarely external to this notch. With very few exceptions the perforation is in the inferior wall of the sinus, but a notable exception is a case pictured by Warren

(Plate 85), which was complicated by pneumatocele, where the thick anterior wall was necrosed. Perforations in the anterior wall are generally along the superciliary ridge.

Other sources give rise to fistulæ in this vicinity, such as orbital abscess, lachrymal cysts, gummata, etc. (to be considered under diagnosis), but an examination of the pus from frontal cases may reveal the presence of ciliated epithelium.

These fistulæ persist until nasal drainage is re-established (but may close temporarily only), or until the sinus is obliterated by surgical intervention.

(c) *Tumor*.—There are several varieties of tumor which may be connected with the frontal sinus, and appear in this area: Abscess (has been considered), mucocele, pneumatocele, malignant tumor.

Mucocele is a rather rare affection. (Case IV, Plate 83.) It is a tumor of very slow formation, and consists in the gradual dilatation of the weaker parts of the sinus walls in cases where an occluded ostium frontale prevents the escape of mucus. The cases may last for years, while the tumor progresses slowly without subjective symptoms. The slow, steady pressure causes the thin inferior surface of the sinus to yield, and the consequence is a tumor at the inner angle of the orbit. Its growth may be so gradual as to fill up a large part of the orbital fossa without ocular disturbance, although the globe of the eye, meanwhile, has been pushed well towards the malar bone. It may also crowd portions of the ethmoid labyrinth towards the nasal septum.

It presents a smooth, rounded surface over which the skin is freely movable, and on the periphery the surface seems to be continuous with the surrounding bone. The tumor is resistant in places and gives rise to the characteristic "egg-shell crackle," as demonstrated in Case IV, but in places where the bony wall is very thin or deficient, it feels soft and fluctuating. These variations give an unevenness to the surface. The tumor as a whole is immovable, except that in certain instances its size may be somewhat temporarily re-

duced by pressure. If there is a rupture in the sac, the contents may be squeezed into the nasal cavity.

Patients suffering from mucocele may complain of tenderness and pain, which are usually accompanied by a change in the size of the tumor. In Case IV the tumor would occasionally decrease considerably and its surface become hard and rough, but at certain seasons it would increase in size and give rise to some pain and be tender on palpation. These collections of mucus may become infected, assume the character of pus with consequent chain of acute symptoms, and then follow the course of an acute abscess connected with the frontal sinus. Unless infection creeps in, these tumors continue for years without rupture; otherwise fistulæ result.

The usual symptoms of mucocele are of a mechanical nature and vary according to the size of the tumor. They may be manifested as dislocation of the globe of the eye; disturbance of the action of ocular muscles; pressure on the optic nerve and ophthalmic vessels.

Disordered function of the lachrymal apparatus. The dislocation of the globe takes place so slowly that the function of the eye remains normal for a long time. The eye is pushed into the corner of the orbit opposite that occupied by the mucocele. Hence it is dislocated outward and downward, commonly with more or less exophthalmos. The fatty tissue, external to the globe, gives way so that the sclerotic coat may be in close proximity to the malar bone. The eye appears smaller than the opposite one, because it is pushed outward under the lids, which meet at the external canthus.

The action of the ocular muscles remains normal for a long time and coördination may never fail. In advanced cases, on the other hand, their function may be interfered with so that double images are formed. Diplopia has never been present in Case IV, although the globe is in contact with the malar bone.

Pressure upon the optic nerve may give rise to choked disk or atrophy of the optic nerve. Amblyopia or amaurosis may be the consequence. These cases are exceptional, and

the tumor must be very large and extend back to the region of the anterior or even posterior ethmoidal cells.

Mechanical disturbance with the lachrymal apparatus is common, as manifested by the overflow of tears down the cheek, which, in turn, may give rise to a troublesome eczema. (Case III.) The intimate relation of the lachrymal sac and nasal duct with the thin lachrymal bone, which continues downward from the inferior surface of the frontal sinus (Plate-20), readily explains the frequency of these symptoms. The lachrymal bone is often pushed forward and outward, forming part of the thin wall of the tumor which presses the lachrymal sac between the tendo oculi and tensor tarsi muscle so as to occlude its lumen.

Pneumatocele is a condition of very unusual occurrence. Simple cases are manifested by the presence of air in the cellular connective tissue in the vicinity of the sinus (emphysema), or still less frequently by a well defined tumor containing air, for the most part. Such conditions presuppose a communication with the nasal cavity. Helly has collected a series of nine cases, while Warren's case of double frontal pneumatocele following perforation of the anterior sinus wall is unique.

The causes leading to this condition may be:

Congenital or acquired dehiscence of the sinus wall. May have to differentiate from orbital dehiscences. (Plates 48, 49, 50.)

Fracture in the frontal bone allowing air to be forced up from the nasal cavity under the skin (emphysema).

Inflammatory processes are the common cause of pneumatocele, consequent on necrosis and perforation of the sinus wall, the overlying skin, moreover, remaining intact. This is the usual cause of this rare complication. Such pneumatoceles are of short duration, and are soon followed either by resolution, or, more commonly, abscess-formation.

New Growths.—New growths of a benignant or malignant nature, primary in the frontal sinus, are also among its rare affections. Their presence need hardly be suspected on

account of any nasal discharge, but should be considered as a possibility on the appearance of any external tumor. This sinus may be involved by a part of a malignant growth originating in the orbital or nasal fossa, as occurred in two cases subjected to extensive operations by Gussenbaur. Primary malignant tumors of the frontal sinus are never diagnosed early, and when discovered are usually beyond help.

The local and possible constitutional symptoms can be readily understood.

(d) *Inflammation in the Orbital Fossa.*—Under the consideration of local inflammation we have seen that mild symptoms and signs may subside with complete resolution, or may end in abscess-formation, and rupture with consequent fistula, but without further destructive process. On the other hand, these processes can be carried further, and the orbital fossa and its contents involved in the inflammatory process. These complications must not only tend to obscure the diagnosis, but also to add to the gravity of the situation.

The constitutional symptoms occasioned thereby are those consequent on any febrile disturbance, and need no further mention. The local symptoms are of importance. The earlier signs are due to œdema or exudation in the internal and superior muscles of the eye, whereby their action is impaired. The usual site of necrosis is in the inferior wall of the sinus, which is in close proximity to the levator palpebræ superioris, rectus superior, rectus internus, and obliquus superior muscles. Hence ptosis is an early sign, together with inflammatory œdema of the upper lid. The ocular paresis or paralysis gives rise to diplopia, consequent on more or less fixation of the affected globe.

As the pus infiltrates the orbit mechanical symptoms due to pressure arise, similar to those described above, but more rapid in their progress, and resulting in greater functional disturbance, in that the parts have no time to become adapted to the altered conditions.

Another group of symptoms follows when the eyeball

itself is involved giving rise to changes which may permanently impair the function of the eye.

Finally, inflammation may be set up in the lachrymal sac or nasal duct, manifested as a catarrhal process or abscess-formation, both of which may lead to occlusion of the lumen of the passage.

Signs and Symptoms referable to the Cerebral Fossa.—One of the possibilities which may result from inflammation in the frontal sinus is perforation of the posterior wall. This may take place during an active inflammation of the sinus with obstructed ostium frontale, or at the time of operation, or weeks and even months later, in consequence of a slowly advancing caries.

In addition to the already existing symptoms, whether they be acute or quiescent, there is a sudden rise of temperature, usually ushered in by a chill. There is frontal headache, unrelieved by medication, and more or less acute pain. The usual amount of exudate from the sinus, if previously discharging, becomes lessened. In a short time the ordinary symptoms of an acute meningitis develop, and the case will progress with the usual variations until the fatal termination.

Focal cerebral symptoms are not frequent, but somnolence and delirium are common features. In the later stages, gravitation will carry the pus backward over the vertex or along the base of the brain, with consequent convulsions or other focal lesions. Perforation of the posterior wall is usually a fatal complication. A series of twenty fatal cases have been collected. The cause of death in twelve cases was a suppurative meningitis; in five cases, abscess of the frontal lobe, and in three cases both abscess and meningitis were present. In three additional fatal cases death was consequent on a thrombo-phlebitis, the frontal sinus serving as the source of infection.

The site of perforation was commonly just to one side and in front of the crista galli, although caries may occur at any point in the posterior wall.

Diagnosis.—Some cases of frontal sinus suppuration may be diagnosed at sight without questioning the patient, other cases need weeks of careful examination and consideration, and, finally, in many instances, the precise location of the suppurating focus must be left problematical until determined by exploratory measures, which may be of value in treatment as well as diagnosis. Many of the procedures used for treatment as well as diagnosis will be more fully considered under subject of treatment.

Conclusions are drawn from the previous history of the patients and from present *subjective* and *objective symptoms*.

Previous History.—A common antecedent history for cases of acute disturbance in the frontal sinus is that of a coryza, and that the frontal pain commenced from one to two weeks after the nasal disturbance began to resolve. We may obtain the history of the trouble which is possibly still existing in the nose, such as polypi, ulcerations, etc.

The patient may have sustained some injury to the frontal bone which has given rise to a sinus complication.

It is of importance to ascertain whether the patient has recently undergone some acute infectious disease, especially of the type previously considered.

Having exhausted the possibilities connected with the previous history, our attention is to be directed to the present symptoms of the case, both subjective and objective. Objective symptoms are of much greater importance than subjective, and with the latter alone a diagnosis must be somewhat problematical. A suggestive previous history, together with existing subjective and objective symptoms, make it easy to diagnose suppuration in some one or more of the nasal accessory sinuses, but a certain differentiation may be most difficult without undertaking operative measures.

At first let us eliminate all lesions not connected with the nasal fossa or its accessory sinuses, which may enter into the question of differential diagnosis.

Elimination of Lesions Extranasal.—*Supraorbital Neu-*

ralgia.—Pain is more or less characteristic and tenderness is at supraorbital notch instead of nearer the median line on the floor of the sinus.

Absence of Nasal or Febrile Symptoms.—History of neuralgia elsewhere.

Migraine, Hemicrania.—Characteristic location and attacks of pain. Absence of all objective symptoms of disturbance in the frontal sinus.

Orbital Complications.—Suppurative diseases in the orbital fossa or its vicinity must be carefully considered in every case of suspected sinus, which may be complicated by similar lesions in this fossa. However, the presence of co-existing nasal symptoms will decide the question. For example,—

Orbital abscess may be primary in the fossa or secondary to perforation of the sinus wall. There is nothing distinctive in the abscess itself or the mechanical and inflammatory consequences. Its location in the upper internal angle of the fossa is more suggestive of frontal sinus origin. Nasal symptoms may be absent, for an occluded ostium frontale is the probable cause of orbital perforation, but the previous history and tenderness over the sinus walls may be suggestive.

Ptosis following cranial lesions is never accompanied by oedema of the lid or inflammatory orbital processes.

Lachrymal Sac and Nasal Duct.—Suppuration in these structures should always lead us to suspect trouble in the anterior ethmoid cells, which in turn are very frequently involved simultaneously with the frontal sinus. Stenosis of the nasal duct with abscess-formation is still more suggestive. Look for nasal symptoms.

Tumors.—A gradually increasing tumor near the upper and inner angle of the orbital fossa, of long duration, without subjective symptoms, occasionally slightly tender, its surface rather hard, often with very slight bony irregularities, is probably a mucocele. This may become infected at any time, with the consequent addition of the symptoms and re-

sults of abscess-formation, of primary or secondary origin in the orbit.

Malignant tumors call for no particular consideration here.

Fistulæ.—A fistula may lead to the orbital fossa simply, or be connected with the frontal sinus or anterior ethmoidal cells. It presupposes, as a rule, the history of acute process located either in the orbital fossa or the accessory sinuses of the nose. The ordinary location of frontal fistulæ has been considered. The presence of tumor or fistula in connection with nasal symptoms, or a suggestive history, simplifies the diagnosis to a large extent. So much for the elimination of lesions external to the nasal fossa or its sinuses.

Nasal Fossa.—The objective symptoms in the larger proportion of cases of frontal suppuration are limited to the nasal fossa. *The important cardinal symptom is the presence of pus.* Hence, we must consider the following possibilities as the source of the pus-formation:

(a) *Acute inflammation* in the nasal fossa.

(b) *Chronic inflammation* in the nasal fossa, complicated or not by hypertrophies or polypi.

(c) *Suppuration* in cells of the middle turbinate.

(d) *Inflammation* in one or more of the accessory sinuses.

Having narrowed our source of pus to these sinuses, the next problem is to determine which sinus is involved, and also to consider the question of association of sinus inflammation.

(a) *Acute Inflammation*.—During acute nasal troubles, it is difficult to decide whether the frontal sinus is involved at the same time. Frontal pain and tenderness are common symptoms attending a "cold in the head," especially during convalescence, and we are now led to believe that acute inflammation of the sinus, of a mild type, is of common occurrence. Delayed frontal tenderness or pain should always arouse our suspicion of local trouble; the continuation of a unilateral nasal discharge should lead us to examine for some sinus affection, but during the acute period of the nasal in-

flammation, symptoms and signs referable to an acute sinus inflammation are very frequently masked.

(b) *Chronic inflammation in the nasal fossa* and its complications.

Very frequently, the first problem to be solved by the surgeon is, as to whether there is any or sufficient cause in the nasal cavity to account for the quantity of pus which may be present there. Most chronic nasal disturbances are attended by a varying amount of exudate which may differ in no respect from that of the sinuses. Hence, without further detail, it will be necessary to eliminate all nasal causes of suppuration. This may cause considerable delay on account of the presence of hypertrophies and polypi which *per se* are commonly the cause of suppuration. In addition, they may act mechanically, obstruct the infundibulum and ostium frontale, and be the only hinderance to the recovery from a sinus inflammation, as well as obscuring its existence.

The preliminary treatment of disturbances in the nasal fossa, therefore, may result in simultaneous cure of the frontal suppuration. The persistence of pus accumulation in the middle meatus under the middle turbinate bone, after the removal of all obstructions, points to a source in the sinuses.

(c) *Cells in the Middle Turbinate*.—A middle turbinate bone, when viewed from the anterior nares, may be seen to be broader than usual. This may be due to a deep sinus turbinalis, whereby the normal concavity of the bone is deeper than normal, or the turbinate may have a double wall, giving rise to the formation of one large cell, or occasionally several cells. The ostium of this cell is almost always at its apex, so that drainage is hindered, and much pus may accumulate therein. Turbinate cells open more frequently into the fissura ethmoidalis inferior, but enough open into the middle meatus to be considered in this connection. (Part I.) Suppuration in these cells may give rise to a considerable amount of exudate.

A deep sinus turbinalis can be differentiated from a large cell by means of the probe with but little difficulty.

(d) *Inflammation in the Accessory Sinuses*.—We are now

supposed to have eliminated all possible external lesions in the vicinity of the frontal sinus, and to have decided as to whether some lesion of nasal origin is adequate to account for all of the exudate found in the nasal fossa. If further sources are suspected, careful and repeated examinations must be made to determine the site where this pus appears first.

The turbinate bodies and the ethmoidal fissures, or their equivalents, with their respective ostia, are so situated that pus appearing here or there suggests that it must come from this or that sinus, or from a certain combination of sinuses. Provided the normal cellular partitions are intact, pus appearing above the middle turbinate bone must be derived from either the sphenoidal sinus, the posterior ethmoidal cells, and two-thirds of the cases where cells appear in the middle turbinate bone. The posterior location of these ostia in the nasal fossa and the contour of the turbinate bone (Part I) are such that exudate from these sources will tend to gravitate towards the pharynx in a great measure, but, nevertheless, it may reach almost any part of the nasal fossa, depending the much-mooted question of the value of this procedure *cern us* except by way of elimination.

Pus appearing between the middle and inferior turbinate bones may emanate from the antrum of Highmore, the frontal sinus, the anterior ethmoidal cells, and from one-third of the middle turbinate bones, possessing cell-like cavities. The problem is to determine which sinus or what combination of sinuses may be involved; it is a difficult problem, and one that many times cannot be solved with any degree of certainty.

All reasonable measures suggested for the diagnosis of sinus affections, whether of much value or not (provided they are not harmful), should be resorted to, because some little point may influence us one way or another in drawing conclusions.

Percussion over the frontal sinus or antrum is of value in deciding the question of tenderness, but their cavities are

too small for sound differences to be detected when full of fluid, as Zenker would have us believe.

Transillumination.—Nothing would be gained by discussing the much mooted question of the value of this procedure in diagnosis. Only the conclusions of the most experienced observers will be given.

Antrum of Highmore.—(1) Its use is often of value; (2) A negative result will not rule out disease of the antrum; (3) A positive result should make us suspicious, but is by no means conclusive evidence of a pathological condition; (4) Normal sinuses in the same subject may give rise to great inequality of the intensity of the light for various reasons.

Frontal Sinus.—Transillumination has been practised in these cases by placing the light either in the buccal cavity or externally under the supraorbital arch. While antrum illumination may be of assistance, its use in suspected frontal sinus cases is anything but satisfactory.

The great variation in the walls of frontal bones, and the unsatisfactory relation of the position of the light and the sinus for the transmission of rays, render frontal transillumination of but little avail in practice.

Auscultation, with the simultaneous insufflation of air, is a procedure which is unwise, on account of the spread of pathogenic bacteria into healthy sinuses, and is of no practical value.

Association of Sinus Affections.—Having exhausted all external methods for the differentiation of the sinuses under consideration, with the possible satisfaction of some evidence gained one way or another, we must resume the nasal examination. The nasal cavity has been cleared of obstructions (pathological), and our one cardinal symptom is the presence of pus in the middle meatus under cover of the middle turbinate bone. As already stated, this exudate may be derived from several sources, and before considering a few cardinal symptoms for each one, let us examine the clinical evidence concerning the association of sinus empyemata, as well as any anatomical reasons for this association.

EMPYEMA OF THE FRONTAL SINUS COMBINED WITH THAT OF THE ANTERIOR ETHMOIDAL CELLS.

Clinical Evidence.—Luc states that frontal empyema is usually associated with the same disease in the anterior ethmoidal cells. Jansen was early to suggest this combination, and reports that in seven frontal cases, all were thus complicated; that the infundibulum was obstructed by hypertrophies,—demonstrated by operation. As a result of autopsy, Zuckerkandl, with an enormous experience, never observed a case of suppuration in the frontal sinus uncomplicated by ethmoidal. E. Fränkel performed 146 autopsies, and did not find a single uncomplicated frontal empyema.

Cases III and V of this paper suffered from empyema of the anterior ethmoid cells in connection with frontal empyema, demonstrated by operation. Evidence obtained by autopsy and operation is indisputable.

There are, on the other hand, undoubtedly many cases of primary origin in the frontal sinus, notably those which can be traced directly to external trauma, but the question naturally arises as to whether in time these cases do not frequently give rise to associated trouble in the ethmoid cells. This will depend upon the anatomical relations of these cells and their ostia to the sinus, and the course of the exudate, and also to the secondary pathological changes acting mechanically or by extension.

Anatomical Evidence.—The intimate relation between the frontal sinus and some of the anterior ethmoid cells and the thinness of their walls has been considered in detail in Part I, hence it will suffice here to enumerate a few of the salient points:

(a) The nasal portion of the floor of the frontal sinus is made up mostly of anterior ethmoid cells, which also crowd into the posterior angle and posterior border of the sinus. Their walls are very thin and easily broken through with instruments.

(b) If a naso-frontal canal is present, it is more or less

surrounded by these cells on three sides,—viz., externally the cells completed by the lachrymal bone, in front the cells on the floor of the sinus just anterior to the ostium frontale, and behind by the cells above the ethmoid bull, which crowd towards the posterior angle of the sinus.

(c) The ostia of these various cells generally open into the upper portion of the infundibulum on different sides, in close proximity to that of the naso-frontal canal, or into the turbinate fossa. (Part I.) These ostia of the cells are distributed with no reference to the drainage of the cells, and may face in any direction. The whole space under consideration is small and the ostia are fairly numerous, so that they are all in very close proximity. Their irregular distribution is such that, no matter what the position of the head, fluid or pus from the frontal sinus tends to flow into some of these cells, so that at least they may act as reservoirs. In time, the constant irritation of pus may give rise to the development of hypertrophies and polypi. These increase the liability of secondary involvement of the cells by adding an obstructive element to the discharge of pus from the frontal sinus.

(d) Trauma, consequent on attempts to probe the ostium frontale, may open the way for infection. There are many clinical cases reported where the writer states that only the frontal sinus was diseased, but unless carefully examined at the time of a very radical external operation or post-mortem, there is absolutely no known method of determining with certainty that some of these cells are not involved.

Hence the clinical evidence and anatomical structure would point very strongly to an involvement, sooner or later, of anterior ethmoidal cells in connection with empyema of the frontal sinus.

EMPYEMA OF THE FRONTAL SINUS AS A CAUSE OF EMPYEMA OF THE ANTRUM OF HIGHMORE.

The Antrum as a Reservoir.—On account of the much larger size of the antrum than the combined anterior ethmoidal cells, and also from the fact that the former is a single

cavity, the latter a series of very small cavities, pus collections in the maxillary sinus are more extensive and more easily recognized. Although the antrum may not be the seat of an inflammatory process, if it serves as a reservoir for pus arising elsewhere, even then this pus collection will give rise to symptoms equally annoying, and which must be relieved.

Let us first examine the clinical evidence in regard to the association of antrum and frontal empyema, complicated or not, as may be the case, with ethmoid suppurations.

Clinical Evidence.—In seven cases of frontal empyema, Lichtwitz noted one antrum complication.

Bryan cites a case of antrum empyema secondary to that of the frontal sinus.

Macdonald says that all of his cases co-existed with suppuration in the antrum and anterior ethmoidal cells.

Ortega states that if both antrum and frontal empyemata are present, the frontal is the primary.

Alexander notes that where frontal empyema is accompanied by the presence of polypi in the vicinity of the infundibulum, there is usually pus in the antrum.

Jansen reports seven cases of frontal empyema, all co-existing with suppuration in the ethmoid cells, six of which had pus in the antrum. He is of the opinion that most frequently we have to do with a combined empyema, and that isolated cases of antrum are more commonly of alveolar origin. He cites one case of suppuration in the antrum which followed his radical operation (see *Treatment*) for frontal empyema, and attributes this consequence to the use of tampons for hæmorrhage. The writer is led to believe that the radical external operation, where a large opening is made through the floor of the sinus into the nasal fossa, of itself is liable to be followed by pus in the antrum, if not already a complication. This statement is based on a study of the regional anatomy, and operations on the cadaver; it will be considered more fully under treatment.

Cases III and V are examples of the association of the three sinuses under consideration.

It is a comparatively simple matter to decide whether the antrum is involved, and it should always be done before operating on the frontal sinus. The inner wall of the antrum should be punctured through the middle or preferably through the inferior meatus, and the antrum contents aspirated, if in sufficient quantity; otherwise the sinus may be irrigated with a small volume of sterile salt solution after the nasal fossa has been cleared of pus. Puncture may be avoided if it is possible to catheterize the sinus.

The existence of ethmoidal empyema alone can be determined only by first eliminating the frontal sinus and the antrum.

Another strong point, suggesting that antrum empyema is often secondary to one of the other sinuses, is the fact of the obstinacy and incurability of many such cases. This obstinacy of antrum cases led Fillebrown to conclude that several cases were prevented from recovering from their antrum troubles on account of empyema of the frontal sinus, which was evidently present in each instance.

Anatomical Evidence.—A detailed account of the anatomy of the structures which intervene between the ostium frontale and the ostium maxillare, together with variations, etc., from the normal, has been given in Part I, hence only certain obvious conclusions need be tabulated here.

(a) In looking at the external wall of the nasal fossa, with the middle turbinate bone removed as far as possible, and this surface held at right angles to the observer, the ostium maxillare is very rarely in the field of vision. Very frequently it can never be seen, no matter how the specimen is held. This is accounted for by the fact that this ostium is concealed by the uncinate process, lies near its lower border so that the whole width of the process obscures the ostium from view. The distance of the lower border of the ostium from the free edge of the process will vary, consequently, according to the width of process and its lateral angle of in-

clination. (Plates 38, 39, 40, 61, 67, 70.) The ostium, therefore, is situated at the lowest part of the infundibulum, and extends somewhat on to its external wall, and could not be better placed to drain the infundibulum, otherwise a blind pocket would exist here. Hence, if fluids once reach the infundibulum, they must gravitate towards the ostium maxillare and thence into the antrum, provided the ostium is patent. The infundibulum acts as a sort of gutter.

(b) In a little less than 50 per cent. of the cases there is a naso-frontal canal which opens into the infundibulum from the frontal sinus. If there are no mechanical obstructions, fluid will gravitate in every instance from the frontal sinus to the antrum, with the head in the erect position.

Many times a straight probe can be made to follow this course, and almost always a more or less curved probe.

Pathological hypertrophies may fill the infundibulum and divert some of the fluid from this course.

(c) In a little more than 50 per cent. of the cases the frontal sinus opens into the highest point of the turbinate fossa by means of little or no canal. Fluid gravitates at once into the general nasal cavity, passing under the middle turbinate bone. Now, very frequently the septum which separates the turbinate fossa from the upper end of the infundibulum is very narrow (Plates 11, 22, 33, 37), so that fluid soon gets into this channel, and its further course continues as above. A wide septum may prevent fluid reaching the infundibulum and cause it to gravitate into the nasal fossa. (Plates 25, 31, 32.) Such will be the result with the head in the erect position, but, in that the head is constantly moving, pus may gravitate in any direction. Frequently a slightly curved probe can be passed through this route (turbinate fossa and infundibulum) into the antrum.

(d) Pus from the anterior ethmoid cells will follow the same laws and course, in that it drains into the infundibulum or turbinate fossa, or both.

(e) Pathological hypertrophies serve both to deflect pus into the infundibulum from the turbinate fossa, and also as

a mechanical hinderance to its passage into the nasal fossa, thereby raising tension and forcing it into ethmoidal cells and antrum, especially if it leaves the frontal sinus under pressure.

The comparatively intimate relation of all these ostia favors the passage of pus from one to the other.

Now and then, in the recent state, the superior border of its processus uncinatus may be so close to the bulla ethmoidalis that the hiatus semilunaris is merely a small ostium and the infundibulum a closed canal, with the ostium maxillare an opening in its side.

The use of the probe and canula, and their practicability and value as means of diagnosis, will be considered under treatment.

Prognosis.—Inferences as to the prognosis of suppurative diseases of the sinus frontalis will naturally be drawn from the foregoing pages. A certain prognosis can never be given, notably in chronic cases, many of which never cease discharging.

Although these cases are rarely fatal, and often only a source of annoyance to both the patient and his companions (nasal discharge with odor), a prognosis should always be guarded and given with some degree of caution, on account of the possibility of extension to the cranial fossa with its usually serious termination. The frontal sinus is occasionally the source of serious septicæmia or pyæmic infection.

Acute cases generally resolve spontaneously in from one to three weeks. There is always the tendency to recurrence with every attack of acute nasal disturbance, and finally the frontal inflammation may become chronic.

Fatal complications come during a primary acute attack or an acute exacerbation in a chronic case.

Chronic cases frequently never recover and are liable to acute exacerbations at any moment. Aside from a constant nasal discharge, they may cause no further trouble. The influence of combined sinus-disease, as well as other possibilities, influencing the course of sinus suppuration need no further consideration here.

The nature of the bacterial infection is of some importance. Streptococcus and staphylococcus infections are more serious than pneumococcus infection.

We do not know why some cases resolve quickly, and others remain chronic. The varying degree of the virulence of the infection, the amount and character of the exudate, the location and depth to which the bacteria have penetrated with varying pathological results, and individual disposition and idiosyncrasy, are all uncertain factors which must enter into the prognosis of these cases.

(TO BE CONCLUDED.)

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 12, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

CASES OF HIP-JOINT AMPUTATION FOR SARCOMA OF FEMUR.

DR. WILLIAM B. COLEY presented two patients for whom he had amputated at the hip-joint on account of sarcoma of the femur. The patients were, respectively, a boy of six years, and



Coley's case of periosteal sarcoma in a boy of six years, amputation at hip-joint.

a girl of thirteen years. He also reported a third case in the person of a man aged forty-nine years. This last case, being one of spindle-celled growth, had been subjected to treatment

with the mixed toxines, with at first apparent benefit, which gradually ceased and increase in growth became again manifest. Amputation was then done. Wyeth's method of controlling hæmorrhage was employed in all these cases, and by this means the hæmorrhage was so absolutely controlled that the loss of blood was but trifling in any of the cases.

GASTROSTOMY BY KADER'S METHOD.

DR. W. W. VAN ARSDALE presented a boy, eight years of age, who, three weeks before his admission to the hospital, on April 1, 1897, swallowed a tumblerful of diluted potash solution. His stomach was immediately washed out, affording temporary relief, but after ten days painful contraction of the œsophagus occurred and swallowing became impossible. Attempts were made by Dr. Gerster to dilate the stricture: at first a No. 15 French urethral bougie could be passed; then, the stricture becoming impassable, gastrotomy was done, and the stricture cut by the silk-string method under retrograde dilatation. This brought relief, but for a time only, and after five weeks the operation was repeated. Permanent tubage by Symond's tubes was then resorted to, but this resulted in ulceration and stricturing at higher portions of the œsophagus, which could not be treated by permanent dilatation, as the larynx became involved.

The patient first came under Dr. Van Arsdale's care on October 1, 1897, six months after his admission to the hospital. Gastrostomy was finally resorted to, to prevent death from inanition. Kader's operation was selected. A vertical skin incision was made and the rectus muscle divided bluntly; the stomach was found adherent to the liver, which was drawn over to the right, and adherent to the peritoneal scar. After opening the stomach, a catheter was stitched to the opening, and the latter invaginated by a series of Lembert sutures; two large silk fillets, passed through the abdominal wall,—not including the skin,—served as retention sutures. After stitching the peritoneum to the stomach, the skin incision was closed about the tube, so that no granulating area was left. Feeding began at once.

The result was very satisfactory. The tube became loosened on the third day. At no time did the gastric fistula leak, nor was there any ulceration or digestion of the skin surrounding the opening. The patient rapidly gained in weight and strength,

and the œsophageal stricture also improved somewhat by rest, some fluid being swallowed.

Dr. Van Arsdale presented a second patient, a child, eighteen months old, who, six weeks before her admission to the hospital, had drank some potash solution used for washing; as a result of this, she was unable to swallow anything but small quantities of fluid. The child lost greatly in weight. When the child was admitted to the hospital, a No. 8 French bougie was the largest size that could be introduced, and on account of the poor condition of the patient, gastrostomy was performed on August 12, 1898, treatment by dilatation being deemed inadvisable. The Kader operation was resorted to. Nourishment was given through the tube about six hours after operating. Since then the patient has been fed partly through the tube and partly by mouth, and has gradually improved in weight and strength.

Dr. Van Arsdale reported a third case of occlusion of the œsophagus resulting from a malignant tumor at the cardiac end of the stomach. The patient was a man, fifty-two years old, who was admitted to the hospital on September 16, 1897. He gave a history of regurgitant vomiting, together with painful and difficult deglutition, dating back to February, 1897. Gastrostomy by Kader's method was performed on September 20, and ten days later the patient was discharged improved. During the course of the operation a digital exploration of the tumor causing the œsophageal obstruction was made, but it was not deemed expedient to remove it. The result was most satisfactory, the patient feeding himself through an articulated metal tube, until his death, three months later.

After referring to the methods of performing gastrostomy recommended by Senn, Fontan, Hall, and Bidwell, Dr. Van Arsdale said he preferred the Kader operation, as it combined in itself the greatest number of advantages at one time, besides being nearly always feasible, excepting, perhaps, in very extreme cases. In the first place, the operation can be done in those cases of very contracted stomach where Witzel's method or that of Marwedel could not be done. Again, it can be done quickly, it being recorded that Mikulicz did one in ten and another in seventeen minutes. As for rapidity, however, the method of the late Dr. Hall appears the most satisfactory. Another advantage is that

no granulating surface remains about the fistula, as is the case with many other methods: consequently, there is little or no scar-formation, excepting a primary one. The tendency to hernia is thus reduced.

In cases of acute obstruction of the œsophagus it has the advantage of closing spontaneously as soon as the tube is permanently removed. Whether it is a decided advantage that the tube should be worn continuously all writers are not agreed. Feeding can begin immediately after the operation; this advantage, however, is shared by a number of the other operations. The operation can be done under cocaine, if necessary.

DR. ROBERT ABBE said that while he considered the Kader operation one of the best we have, it seemed a little less simple than the one to which Dr. Van Arsdale had referred as Hall's method, with its modifications, and also Senn's. The operation of gastrostomy should be simplified as much as possible, in order to acquire a non-leaking fistula. This is accomplished by the inversion method. The speaker said he had been induced to try the Senn method, but he had found it much more difficult and in no wise superior to simple inversion of a cone of the stomach. The speaker said he had resorted to the latter expedient exclusively for five years past, after his own device. Altogether, he had operated thus six times, twice under cocaine. He described the operation as follows: Through a vertical median incision a cone of the stomach is drawn out and stitched to the peritoneum, exposing a circle two inches in circumference. Around the central point of this circle a purse-string suture is passed, including a small circle one-half inch in diameter. Here the stomach wall is punctured and a catheter introduced, around which the purse-string suture is snugly tied. A second and then a third purse-string suture is then introduced outside of the first one, and by tying these tightly around the catheter the cone of the stomach becomes inverted. The catheter is held by three rows of purse-string sutures. The outer wound can then be closed and the patient can be fed immediately. This method permits of absolutely no leakage. At the end of a week the tube can be taken out and slipped in again at pleasure.

Dr. Abbe said that in one of his six cases the patient had a cancerous mass at the lower end of the œsophagus; death took place four days after the operation from hæmorrhage from this

mass, and at the autopsy it was found that there was not the slightest leakage at the site of the wound, tested by hydraulic pressure. In most instances, Dr. Abbe said, gastrostomy is done for malignant disease, and the patients have not very long to live. In two of his cases the operation was done for aneurism of the aorta, which caused death within six months afterwards.

Dr. Abbe said that about five or six years ago he had first employed his string method of dividing traumatic stricture of the œsophagus. He had recently seen his first patient, who has no trouble in introducing the largest sized bougie, and its use has long since become unnecessary.

RESECTION OF THE SIGMOID FLEXURE FOR INTESTINAL OBSTRUCTION.

DR. HOWARD LILIENTHAL presented a man, sixty-five years old, who had first been seen by him in June previous. He stated that he had enjoyed good health up to two years before, when he began to suffer from constipation, which gradually grew more and more annoying. His first attack of obstruction of the bowels occurred about two weeks previous to the time when he first came under Dr. Lilienthal's observation. The attack had lasted several hours, and was finally relieved by castor oil. The speaker was called to see him in consultation on the fourth day of his second attack; during those four days, in spite of laxatives, enemata with turpentine, etc., neither fæces nor flatus had been passed; the vomiting, which at first had been constant and severe, gradually subsided; there was general abdominal pain, griping in character, with distention, which was most marked on the right side; the rectum was completely empty; the pulse was good. The speaker said he was led to the belief that he had to deal with a chronic volvulus at the sigmoid flexure, which had partially reduced itself. On the following day the man was sent to the hospital, where a successful attempt was made to move the bowels by an enema. In spite of this, an exploratory operation was advised and accepted by the patient. It was performed several days later.

An incision on the left side of the abdomen revealed a hard mass in the upper part of the sigmoid flexure, which, after some difficulty, was drawn up into the wound; the mass was small in size, involving about an inch and a quarter of gut, and constrict-

ing the lumen to such an extent that only a small-sized lead-pencil could be passed through. The gut was resected at this point and a Murphy button inserted. On account of the man's age and condition, and the fact that one of the sutures had leaked, a small drain was put in. Four or five days later a fæcal fistula developed at that point. The button was passed through the anus at the end of three weeks, and shortly afterwards the fæcal fistula closed spontaneously. The patient still complains at times of abdominal distention, which is probably the result of a paralysis of the intestinal walls, although his bowels move regularly and he passes gas. The pathologist reported that the growth was an adenocarcinoma. No enlarged glands were found at the time of the operation, and the man now appears to enjoy excellent health.

Dr. Lilienthal said this was the second case he had seen in which leakage had occurred around the Murphy button. He attributed it to the fact that the button may produce a spot of pressure necrosis in old or feeble individuals.

Dr. McCosh said that his own experience in the use of the Murphy button, in the large intestine, had been somewhat similar to that of Dr. Lilienthal. In one case where the entire sigmoid was resected for cancer, the patient died in four or five days, and at the autopsy it was found that considerable fæcal leakage had taken place about the button into the peritoneal cavity. In that case the wound had been closed without drainage.

THE TREATMENT OF THE INTESTINAL PARALYSIS OF PERITONITIS BY ENTEROSTOMY.

Dr. W. W. VAN ARSDALE read a paper with the above title, for which see page 1.

Dr. LILIENTHAL said he thought Dr. Van Arsdale's idea of opening the intestine in cases of paralysis of the gut after operation was an excellent one, for two reasons: First, it allows the gas to escape, and, second, we get rid of the accumulated putrefying material in the bowels. The speaker said that since last June he had been working along the same lines as those laid down in Dr. Van Arsdale's paper. He had resorted to this expedient in about six of fifteen cases of general peritonitis, with four deaths. But one of the cases, where enterotomy was performed, died. In each one of the fifteen cases the clinical signs

and symptoms were accompanied by the presence of pus in the general peritoneal cavity, and a pathological examination disclosed usually the colon bacillus,—occasionally the staphylococcus. Dr. Lilienthal said that in these cases he had usually resorted to enterotomy rather than enterostomy. There are cases where the establishment of an artificial opening in the intestines, especially if it is made high up, may be bad for the patient's general nutrition; it certainly is dirty, even with careful packing, and the speaker said he thought his own method of treating these cases was just a step in advance of that advocated by the reader of the paper.

Dr. Lilienthal said that in a case where the intestines are distended to such a degree that he fears the existence of paresis, he draws out the most distended coil, packs it around with sterilized gauze, and then opens it longitudinally with the scissors. Through such an opening one can generally milk out an enormous quantity of liquid from the inside of the intestine, while the gas, of course, escapes freely. Several loops may be emptied in this way through one incision, until a kink in the intestine prevents further manipulation; the incision is then immediately closed with fine silk; and the same procedure is repeated, if necessary, with another distended loop. In this way he had made as many as four openings in the large and small intestine, entirely disregarding the portion of the intestine he was dealing with. The incision he makes can usually be closed with six stitches, and good, firm union secured. The bowels can be completely emptied by this procedure, and the abdomen becomes perfectly flaccid. The speaker said he had never had leakage occur through such openings after the completion of the operation.

The speaker expressed the opinion that more patients died of intestinal distention after operation than had been heretofore supposed. He is accustomed to resort to this operation even after the occurrence of distention, or if the patient is not absolutely moribund. He never puts a drainage-tube into the peritoneal cavity, excepting in cases where the pelvis has been filled with pus; in such cases he inserts a wick of gauze, which can be left in for two or three days. The gauze is preferable to a rubber tube, as the former leaves a soft sinus, while the latter leaves a hard one which it may be difficult to close.

DR. McCOSH said he was not as enthusiastic regarding the

value of enterostomy in these cases as the reader of the paper. Many surgeons have resorted to this expedient with very unsatisfactory results. Personally he had done enterostomy in about half a dozen cases, all of them, however, being in a desperate condition. All had resulted fatally. Enterotomy he had done more frequently,—perhaps fifteen times,—and while it relieved the intestines temporarily, no permanent good effect was apparent. Theoretically, the operation is certainly very alluring, and it appears, in his opinion, that it should be of some value.

The speaker said he agreed with Dr. Lilienthal that distention was a very important symptom to overcome. Such cases are usually desperate ones, and while in a series of a dozen or so, where all conditions are favorable, the patients being young and vigorous, the disease not being far advanced, and, perhaps, the infection of mild degree, a favorable death-rate, say of 60 or 70 per cent., may be obtained; yet in a long series, say of 100 cases, the mortality must necessarily be very high, from 75 to 90 per cent.

DR. ROBERT ABBE said he had resorted to enterotomy or enterostomy in six or eight cases as a secondary procedure, but never with success. When the intestine was opened, a limited quantity of fluid would usually escape. His experience with the operation had been similar to that of a number of English surgeons who had written on this subject. The escape of fæces and gas is usually limited to kinks in the intestine. This difficulty might be overcome, as in the case cited by Dr. Van Arsdale, by forcing in a saline solution.

Dr. Abbe said that, during the past summer, he had done an enterostomy on two occasions for typhoid perforations, making a permanent opening; a very insignificant amount of material escaped, however, and the patients both succumbed. The fatal result in cases of general peritonitis, while no doubt partially due to the enormous pressure on the diaphragm and heart, is probably chiefly attributable to the toxæmia.

DR. ALEXANDER B. JOHNSON said that he too had tried the effect of opening the intestine in cases of peritonitis, sometimes to allow the escape of the poisonous contents of the bowels, and overcome what appeared to be a high degree of paralysis. In one case, coming under his observation, the patient had received a kick in the abdomen five days previously, evidently

producing a rupture of the bowel, the exact location of which was uncertain, as the belly was uniformly distended. It was accordingly opened in the median line, and in searching for the rupture it was necessary to completely eviscerate the patient; the bowels were so greatly distended that the small intestines were opened and milked out; a rupture was then found in the sigmoid flexure, and through this more of the contents of the bowels were removed. Although the distention was completely relieved, the patient died. Dr. Johnson said his experience with this operation, as a life-saving measure, had proven very unsatisfactory.

DR. L. W. HOTCHKISS said he had resorted to enterotomy in several cases of general peritonitis with great distention of the intestine, but thus far he had never succeeded in saving the life of a patient by this expedient.

DR. FRED. LANGE said that his experience in opening the intestine in cases of general peritonitis was about similar to that of Dr. Abbe. Whether the patient will die or get well depends on the gravity of the case, the fatal issue being probably chiefly due to the absorption of poison from the peritoneal cavity and its virulence. In one case of general peritonitis of a subacute type, with symptoms of ileus, in which the speaker resorted to the procedure which Dr. Lilienthal had described, the patient's death was apparently hastened by the operation. A very important point in connection with the real value of a method is to get as definite an idea as possible of the true condition of things,—*i.e.*, what pathological changes, upon which we rest our diagnosis of general peritonitis, are present, and to what degree are they developed? According to the statement made by Dr. Lilienthal, he has operated in fifteen of these cases with only four deaths; other surgeons, who have carried out practically the same method, have had entirely different results. This evidently indicates a considerable difference of opinion as to what the indications for such operative interference are. Distention of the intestine alone does not mean peritonitis; it merely indicates a paretic condition of the bowel, or even merely stagnation. The thoroughness with which Dr. Lilienthal was able to empty the bowel seems to indicate that in a number of his cases the paralytic condition of the gut must have been moderate. How far that might correspond to a proportionate degree of inflammation he could not tell.

DR. LILIENTHAL, in reply to Dr. Lange, said that the symptom of intestinal distention was only present in five or six of the fifteen cases he had referred to. The speaker said he was well aware that distention alone did not mean peritonitis; he believed, that, in order to have peritonitis there must be a septic inflammation of the peritoneum, and in addition to the clinical symptoms, the usual signs of sepsis and the presence of free fluid in the peritoneal cavity, we should look for the pathological germs. Cultures were taken in all of his fifteen cases.

DR. LANGE said that satisfactory culture-tests from the fluid of the peritoneal cavity could not be regarded as proof of the existence of a general peritonitis.

EXTIRPATION OF THE ILEO-CÆCAL COIL.

DR. LILIENTHAL exhibited a specimen which he had removed from a man, thirty-one years old, who had been brought to this city, from his home in New Orleans, by Dr. Levy, his attending physician. When Dr. Lilienthal first saw the patient, on September 6, 1898, he gave the following history: He had enjoyed good health until two years previous to that date, when he had an attack of illness which resembled appendicitis. Subsequent to that time he suffered from vague distress in the abdomen with occasional vomiting, which usually occurred shortly after eating, accompanied by rapid emaciation. He was examined by numerous physicians, and the diagnosis rested between cancer of the pylorus or some other portion of the intestinal tract and disease of the gall-bladder. The man was tall, extremely emaciated, very pale and cachectic, and so weak that he was scarcely able to walk. His pulse was weak and thready, and his conjunctiva and lips were almost as pale as his face. Examination showed a large, hard, nodular, movable tumor situated to the right of the umbilicus. Through the abdominal wall it felt like a medium-sized orange. It was painful on pressure. Manipulation did not cause nausea or visible peristalsis. The abdomen was lax; there was some gurgling, especially confined to the right side of the tumor. After a test-meal the stomach contents were examined; hydrochloric acid, free and in combination, was found, and no lactic acid. Inflation of the stomach was attempted, but the man was unable to bear it. Inflation of the colon gave no information. The urine was normal.

An exploratory operation was performed on September 9, 1898. A crescentic incision was made, with the navel between the horns of the crescent. After cutting through the right rectus muscle a tumor was felt at the hepatic flexure of the colon. The incision was made sufficiently large to inspect the stomach, which was found at the hepatic flexure of the colon, and there were adhesions between the first part of the transverse colon and the upper part of the ascending colon; to this mass the appendix was attached by its tip, the cæcum being drawn pretty well up. No enlarged glands were felt. The mesocolon was moderately long. Resection of the bowel was decided upon and immediately performed, the incision through the transverse colon being made about the junction of the middle with the right third, and into the divided end, one-half of a Murphy button was inserted. On account of the proximity of the ileo-cæcal valve the ileum was cut through just before it enters the cæcum, thus completing a resection which extended from the ileo-cæcal valve to one-third the distance across the transverse colon. Anastomosis was then made by means of the Murphy button, the female half of a small button being in the ileum, the male half of a larger one in the colon. Closure was perfect. The fascia and peritoneum were then closed, leaving the skin wound open, and a small fillet of gauze was introduced for drainage. The button was passed on the fourteenth day. Four days later the man's temperature went up to 102° F., and, upon aspiration, pus was found in the cavity where the tumor had been located. The pus was evacuated, and recently, when the patient left for his home in the South, only a small sinus remained. Since the operation the man has had no vomiting, and his general health has greatly improved. The tumor was pronounced an adenoma, without any signs of malignancy. The speaker thought it possible that the growth was due to an attack of appendicitis two years ago, the appendix becoming adherent, with subsequent degeneration of the cicatricial tissue.

EDITORIAL ARTICLE.

ALSBERG ON COXA VARA.¹

ALSBERG contributes a memoir which, while not neglecting other phases of coxa vara, devotes especial attention to the anatomical and clinical features of the deformity. While to Müller credit is usually given for the first clinical observation, the deformity had been previously observed by others in post-mortem specimens. Since the publication of Müller's case, numerous others have appeared from time to time, thus providing a profusion of material for a careful study of the condition in all its various phases. As to the adoption of the term "coxa vara" there has been some dispute, especially among German authorities. A small minority, of which Kocher is the representative, contend that the term "coxa vara" should be reserved for that class which present a deformity analogous to that assumed in pes varus,—viz., extension with outward rotation and moderate adduction. The argument advanced by the majority, against the propriety of this interpretation of the term coxa vara, is approved by the author,—namely, that extension is not implied in the term pes varus; that if it is desired to express this idea the term pes-equino-varus is employed. The functional changes that are associated with this deformity are so lucidly described in Hofmeister's first publication that repetition is unnecessary. The author has directed his energies towards the discovery of a means of estimating the degree of varus. On a vertical section of the upper end of the femur two points are selected on the margin of the articular cartilage diagonally opposite one another.

¹ Adolph Alsberg (Cassel), *Zeitschrift für Orthopädische Chirurgie*, Band vi, Heft 1, 1898.

A line uniting these two points will, if continued, intersect a line representing the long axis of the femur, and the angle formed at the intersection serves as the desired standard. According to measurements, taken in seventy-nine femurs, the average angle was 41.5 degrees, the smallest 25 degrees, and the largest 54 degrees. This great variation in the angles is to be accounted for by the varying obliquity of the pelvis, and therewith the acetabulum. Further investigations proved that, if this angle was greater than normal, the diaphysis of the shaft was in abduction,—that is, in the position of valgus; and *vice versa*, if the angle was less than normal, the diaphysis was in adduction or in the position of varus. While in previous publications attention has been called to the rôles played by the altered shape of the bone and by the atrophy of the muscles of the hip and thigh, in the production of the functional disturbances of the joint, no attention has been paid to the effect of this deformity upon the functional activity of the pelvic muscles, those inserted in the great trochanter. It will be seen at a glance that, theoretically at least, the upward and backward displacement of the great trochanter, the point of insertion of these muscles, will thereby diminish, if not altogether abolish their power of abduction, a disturbance of function similar to that observed in congenital luxation of the hips. This may be proven by demonstrating the presence of the Trendelenburg symptom,—*i.e.*, if the patient stands upon the affected limb, the pelvis will incline towards the sound side, since the abductors have not the power to retain the pelvis in a horizontal position.

Since coxa vara is but an anatomical condition, pure and simple, brought about by different pathological conditions, Alsborg adopts a classification which is founded upon its etiology. Thus coxa vara may be a congenital affection, (1) associated with congenital deformities of other joints, or (2) with congenital luxation of the hip. As an acquired affection it may be due (1) to rhachitis, (2) to a disease of adolescence, (3) to osteomalacia, (4)

to osteitis fibrosa, (5) to osteomyelitis, (6) to tuberculosis, (7) to arthritis deformans, and (8) to certain mechanical conditions.

The existence of coxa vara as a congenital affection is undoubted. Kredel first called attention to this variety, and published a report of several cases, which was followed later on by the observations of Zehnder and Kirmisson. The cases described by the latter belong rather to the rhachitic class.

It is questionable whether this deformity of the head and neck, when associated with congenital luxation of the hip, should be regarded as a true instance of coxa vara. It is well known, however, that in cases of congenital luxation there is a deformity of neck simulating coxa vara, but, inasmuch as the head of the bone is out of the acetabulum, it would seem incorrect to include this condition in this category. Reposition of the head into the acetabulum, however, will give the exact clinical picture of coxa vara.

Since the attention of surgeons has been called, of late, to this deformity of the femoral neck, it will probably be more commonly observed and recognized in rhachitic children. To Launstein is credited the exhibition of the first specimen from a rhachitic child. Kirmisson and Charpentier pointed out the danger of making an erroneous diagnosis by mistaking a rhachitic curvature of the upper portion of the diaphysis for curvature of the neck. The Röntgen ray has proven this mistake to have been made. As illustrating this point Alsberg cites the cases of two children, who presented all the clinical signs of bilateral coxa vara, while the skiagraphs proved that there was a marked dissimilarity in the two sides. In order to avoid making an erroneous diagnosis, one must bear in mind that there are a great variety of rhachitic deformities of the upper end of the femur, and that the diagnosis cannot be made solely from the clinical picture.

The second group includes those cases that appear at the period of adolescence. The argument might well be advanced that in a classification based on the etiology, this is not properly

a subdivision. In reply it may be said that this really constitutes a class the etiology of which is not definitely agreed upon, and for this reason this subdivision has been made. The cause has been by some attributed to juvenile osteomalacia (Whitman), but the entire question is still an open one. That there is present some softening process, whatever that may be, is agreed upon by all; so too are all agreed that the deformity is the result of certain static conditions. This variety has been subdivided by Hofmeister into three groups, according to its different manifestations, and to the second of these groups alone (*i.e.*, where there is backward and downward bending of the neck, which is twisted on its long axis) Kocher applies the term *coxa vara*. Alsberg disapproves of this nomenclature, regarding the term purely as an expression of certain general anatomical conditions,—*e.g.*, *cubitus varus* or *genu valgum*. There are many varieties of the deformity; in some the neck is shortened, in others it is lengthened; the convexity may be forward or backward, and so on. Attention is called to the fact that the entire articular surface is not within the acetabulum, a great portion of it projecting from the cavity, a condition which, if it existed in other joints, would be termed a subluxation. The limited amount of articular surface within the acetabulum naturally limits the range of motion; if the articular surface was entirely concealed in the acetabulum the limb would occupy an almost horizontal position. The symptoms and clinical course have been so carefully described in previous publications that they are here omitted.

The third group of cases are those due to osteomalacia. Associated with those of the hip are deformities often of various other bones in the body, as was illustrated in Hofmeister's case. It is probable that this variety exists much more frequently than is commonly supposed; it no doubt often escapes observation, since patients with osteomalacia are so often bedridden, and under such circumstances the deformity would not be of a very pronounced type.

Keister records the only case due to osteitis fibrosa. The

true nature of the case was not recognized till the autopsy, when the head and neck were found to present an exaggerated type of the deformity. A histological examination revealed a marked decrease of the compact substance and a corresponding increase of medullary substance. This pathological process is not unlike that described by Czerny as "lokale malacie," by Paget as osteitis deformans, and by Recklinghausen as osteomyelitis fibrosa. These changes are prone to occur in all those parts of the skeleton subjected to pressure, but more especially in the epiphyseal end of the femur.

Volkman, Schede, Oberst, and Diesterweg have each recorded cases of coxa vara due to osteomyelitis. Volkman emphasizes the fact that the yielding of the bone must take place during the inflammatory stage, since, at the autopsy, the distorted bones are found to have become markedly sclerotic. That osteomyelitis is not usually recorded as a cause of coxa vara is, according to Oberst, explained by the fact that the patient, during the illness, is confined to bed, thus relieving the bones of the effects of pressure. Oberst says, further, that if osteomyelitis attacks the bone in the neighborhood of the epiphyseal line, certain deformities may result which may simulate coxa vara.

Since it has been demonstrated that acute inflammatory affections of the bone may cause this deformity, there is reason to believe that the same effect may be produced by chronic inflammatory processes, of which tuberculosis is the most common variety. While no pathological specimens have been secured which prove beyond a doubt the lesion to be of a tubercular nature, it is not unreasonable to assume this to be a fact, in view of the frequency of coxitis, which, in many cases, terminates in resolution without suppuration.

Arthritis deformans is responsible for not a few cases of coxa vara. The deformity may be due to a bending of the neck or to a deformity of the head, due to an alteration of the articular surface, induced by a diminution of bony tissue on one side, with a simultaneous deposit of osteophytes on the other. In many

instances the plane of the articular surface becomes more oblique, sometimes approaching the horizontal, so that if there be a slight bending of the neck, it will be compensated for by the obliquity of the articular surface, and for this reason the clinical signs of coxa vara will not be present.

It has already been demonstrated that certain softening processes and inflammatory conditions in the neck of the femur may cause coxa vara, there remains yet to be discussed the final group of the series, which includes those cases of traumatic origin. This may be either an epiphyseal separation or a fracture, not necessarily impacted, of the neck of the femur. The differential diagnosis between one or other of these injuries and coxa vara of traumatic origin is oftentimes a difficult matter. Whitman called attention to the fact that fracture of the neck in children is an accident of not infrequent occurrence, and frequently escapes observation. Borchard recorded a case in which the deformity (coxa vara) had undoubtedly been present for some time, but the patient was unconscious of its presence until the condition was aggravated by trauma. When this patient reaches the age of puberty the differential diagnosis between coxa vara traumatica and coxa vara adolescentium will be no easy matter.

If the etiology of the case in hand is clearly understood certain prophylactic measures may be adopted to check the progressive nature of the deformity. Kredel and Schede pointed out that certain positions, which rhachitic children are wont to assume when in bed, will bring about changes in the shape of the femoral neck. In puerperal osteomalacia the deformity may be altogether checked in its incipiency by maintaining the feet in a proper position and applying extension. If arthritis deformans be the underlying cause, it may be possible to prevent the limb assuming the position of adduction by strengthening the muscles of abduction by means of massage and rational gymnastics. The treatment may include the wearing of a high sole on the sound side and a splint that will keep the limb in abduction. Coxa vara, following osteomyelitis, tuberculosis, or osteitis fibrosa is such an uncommon affair that the discussion of

appropriate prophylactic measures is of little practical importance. Should the deformity have passed the incipient stage, the treatment must be either conservative or operative. During the painful stage rest in bed, with extension, offers the most relief. When pain has subsided our efforts should be directed towards improving the muscles of abduction by appropriate exercises, and towards taking such measures as will correct or modify the position of adduction. To this end forcible correction or tenotomy may be called into play. Osteotomy is the operation that is finally resorted to, and whether the bone should be divided through the neck or below the trochanters is a question of dispute. Kraske and Büdinger attacked the neck of the bone, since that was the seat of the deformity, claiming that while a subtrochanteric osteotomy might correct the deformity, it could never restore function. There are several objections to their mode of attack: it is difficult to ascertain in what portion of the neck the deformity lies, the changes of the head and articular surface are, at the time of operation, usually so marked that restoration of functional results cannot be hoped for; the actual results of the operation have not been satisfactory; finally, the danger of joint-infection is not imaginary. The most rational site at which to divide the bone is below the trochanter, and after the osteotomy is performed the bone should be retained in a position of marked abduction. After consolidation has taken place, and the limb is adducted sufficiently to make it parallel to its fellow, not only is the trochanter major farther removed from the pelvic wall, but the angle formed by the neck with the shaft will be increased, thereby increasing the abducting power of the pelvic muscles. Theoretically, therefore, the functional activity of the limb is greatly improved, and the amount of shortening is diminished, while the dangers attending the operation are considerably less. Finally, the propriety of performing a formal excision will suggest itself, when the disturbance of function is pronounced. It is in many cases a perfectly justifiable procedure.

CHARLES H. FRAZIER.

REVIEWS OF BOOKS.

A MANUAL OF SURGERY. For Students and Practitioners. By WILLIAM ROSE, M.B., B.S. (Lond.), F.R.C.S., and ALBERT CARLESS, M.S. (Lond.), F.R.C.S. One 8vo volume, profusely illustrated. New York: William Wood & Co.

Under the above title the authors present a work on surgery, the need for which they see in the paucity of brief textbooks, the idea being to present the main facts succinctly for the student, while some detail is included for the busy practitioner. Whether it is possible to combine happily elementary science for beginners with the more advanced needs of practitioners is a question of some moment.

Beginning with Inflammation, the subjects are developed progressively, the more specialized being reserved for the later pages. The treatment is topical, and the heavy-faced headings of the paragraphs is of great convenience. The introduction of specific instances illustrative of the various conditions is worthy of favorable notice. A few pages are devoted to the consideration of micro-organisms as causes of inflammation, and are comprehensive enough to touch on the main points of bacteriology. Pathology and treatment are briefly discussed.

The following chapter treating of "Suppuration and Abscess" gives the impression that these are things apart from inflammation. Some confusion, too, arises from the different meanings attaching to the term "sepsis" here and abroad. The adherence to the names of the older surgery is noticeable. "Abscess" is treated of in one chapter as a specific condition, cellulitis in quite a remote part as another, when both might better be regarded as acute, non-specific, suppurative inflammations,

the one circumscribed, the other general. It were wiser, perhaps, to lay down first the broad general principles of surgery and surgical diseases, with their well-defined nomenclature, and to group about and evolve from them the various special conditions.

Scalds and burns are treated of under the head of gangrene, together with frost-bite, carbuncle, boils, and cancrum oris, these being included under specific, while the gangrenes, usually so called, are classed as idiopathic and traumatic.

A chapter is made of "Sepsis and Infection." Sepsis is held to be of saprophytic origin, as in the constitutional disturbances subsequent upon moist gangrene; while infection is due to the introduction into the blood of the true pathogenic bacteria. The classification includes cellulitis, erysipelas, septicæmia, pyæmia, tetanus, hydrophobia, and anthrax; while, following Virchow, syphilis, tuberculosis, glanders, leprosy, and actinomycosis are grouped as "infective granulomata." All these receive individual consideration, the section on tetanus being particularly able, while that on septicæmia is perhaps the least satisfactory. Tuberculosis, as is syphilis in the latter part of the volume, is considered rather more in detail than is usual in text-books on surgery.

A section is devoted to tumors and cysts. No mention of endothelioma appears, but considerable space is given to the description of "rodent ulcer" and the histological varieties of cancer which might better be reserved for text-books on pathology. Carcinoma is carcinoma wherever found, and its minor characteristics will vary with its anatomical surroundings. The same remark applies to the repetition of methods of treatment. A free hand and excision wide of its borders are the important points to urge, the special steps of operation being necessarily governed by the relations of neighboring structures.

After devoting three pages of fine print to the description of antiseptic surgery, in which carbolic acid is lauded as the ideal

germicide, *asepsis*, the most important modern advance in surgical science, is dismissed in the following words: "Of late years many Continental and American surgeons have been attempting to eliminate the irritating properties of chemical antiseptics by the adoption of what is called aseptic surgery. In this, asepsis is obtained by means of heat, the most powerful germicide in our possession; the instruments, ligatures, sutures, and dressings are sterilized by placing them for an hour or so in a hot-air chamber raised to such a temperature as to destroy all germs, or by boiling them. Such a plan has been employed with much success, but requires infinitely more attention to details than does the antiseptic method. Where our assistants are constantly changing, as in a large teaching hospital, and where many hands are engaged in the work, there is much greater risk of failure. Most elaborate precautions are also taken as to the dress, both of the surgeon and his assistants, or of any on-lookers; whilst operating theatres, tables, etc., are all disinfected in a most careful manner. Resting, however, on the accredited fact that the great proportion of organisms contained in the air are harmless, and also knowing by experience that the precautions as to antiseptics, sketched out above, are quite sufficient in order to obtain the most perfect results, we have no hesitation in maintaining that for all ordinary purposes (and especially in large city hospitals) the antiseptic method is far preferable to the so-called aseptic plan."

While in the main the considerations on wound-repair and treatment conform to modern standards, the declaration of principles contained in the foregoing excerpt will greatly impair the value of the work to American surgeons.

The chapters on hæmorrhage and on the arteries and veins are all good, though, perhaps, the results of Trendelenburg's operation on the saphenous vein are better than the authors give credit for.

The section on nerves is full and extremely interesting, the

various procedures for the relief of trigeminal neuralgia being taken up in detail. The same may be said of the chapter on brain surgery.

Under "Injuries to Bones" the ambulatory treatment of fractures is mentioned, as is that by massage. For the treatment of non-union, or of vicious union, the open method with the use of ivory pegs, silver wire or nickel-plated screws is advocated. We note that the treatment of fracture of the lower jaw by means of interdental splints receives no mention, nor does Velpeau's dressing for fractured clavicles. Among the directions for applying traction in treatment of fracture of the femur the reader is told to "carry the adhesive plaster nearly as high as the knee." A query as to the ultimate fate of the lateral ligaments of the knee-joint is ventured.

The chapter on diseases of bones is good. There are included rickets, osteitis deformans, and acromegaly. Diseases of the joints, however, fall into the same lack of systematic treatment already noted, and tubercular hip-joint disease is treated very briefly in comparison with the importance of the subject. Why not include this, with diseases and deformities of the spine, ankle, knee, etc., in a general section on orthopædic surgery, and make the whole subject, a most important because conservative one, more comprehensive?

The pages devoted to affections of the mouth, throat, and œsophagus, to the thyroid gland, and to the surgery of the air-passages, lungs, and chest are all valuable, the last named being a trifle too conservative, perhaps.

Diseases of the breast are separated from the chapters on cancer, tumor, etc., and considered by themselves. The chapter is full, carefully considered, and reflects the modern belief in thorough extirpation of suspicious growths, though too great conservatism exists here as well. If it is considered best to remove the pectoralis major muscle in suspicious cases, why not make assurance doubly sure and remove always? It is to be

noted that the lymphatics lying high up beneath the pectoralis minor are nearly always affected in carcinoma mammae, and can only be effectually gotten at by first reflecting that muscle. In the absence of the pectoralis major the minor may be sacrificed without serious detriment to the patient.

The authors recognize peritonitis as acute diffuse, acute localized, simple chronic, and tubercular. They urge incision and drainage with irrigation in the first variety. A full *résumé* of modern abdominal surgery is given, not including hernia and intestinal obstruction, both of which, however, belong in that section, as the principles governing their treatment are identical. It is noticeable that operations on the female pelvic organs are excluded, and the question naturally arises why the fully equipped surgeon should not include this large class of cases in his care, rather than leave the field to "specialists." Under treatment the authors prefer to exclude all stomach feeding for the twenty-four hours succeeding operation, and trust to nutrient enemata. They let the bowels look out for themselves.

Chapters on hernia and on the kidney are full and interesting. In the former they prefer Mitchell Banks's operation, with Bassini's for special cases. They note a large proportion of recurrences.

A full chapter is devoted to the bladder and prostate, the operations by the suprapubic and perineal routes being considered in detail. For the removal of moderate-sized calculi lithotripsy by Bigelow's method is warmly advocated. Plastic operations and anæsthesia, briefly considered, conclude the volume.

To sum up, it must be borne in mind that the book is written by English surgeons, deals with English methods, and is intended for English students and practitioners. This fact alone limits its usefulness as a text-book for American students, who are taught, for instance, that ether is the anæsthetic of election and chloroform of necessity in practically all classes of opera-

tions, while its lack of scientific arrangement and the adherence to the older terminology are also objectionable. It is not sufficiently full for a reference book, although the arrangement in paragraphs makes a quick comprehension of the subject sought for easy.

It is, however, from the pens of men of great surgical ability, and is, in practice, sound. The style is clear, the composition easy, and the treatment brief, succinct, and pointed.

HENRY GOODWIN WEBSTER.

THE DISEASES OF THE STOMACH. By WILLIAM W. VAN VALZAH, A.M., M.D., Professor of General Medicine and Diseases of the Digestive System in the New York Polyclinic Medical School and Hospital, and J. DOUGLAS NISBET, A.B., M.D., Adjunct Professor of General Medicine and Diseases of the Digestive System in the New York Polyclinic Medical School and Hospital. 8vo, pp. 550. Illustrated. Philadelphia: W. B. Saunders, 1898.

The increased interest recently manifested in the study of the diseases of the stomach is due to the decided improvement in the diagnostic methods.

A thorough acquaintance with these valuable diagnostic means is essential to the early recognition and proper treatment of the diseases of the stomach.

To the student and general practitioner who desires to obtain a thorough knowledge of this subject, the book of Van Valzah and Nisbet will be a valuable aid and guide.

Its very attractive form and clear language will tend to generalize the use of the newer diagnostic methods and of modern therapeutics. The work of Van Valzah and Nisbet is not only a diligent and well-arranged compilation of facts and data obtained from the literature on the subject, but it embodies the results of the authors' original researches and the fruits of independent study.

The material is well arranged, filling 550 pages. Most of the illustrations are taken from specimens in possession of the authors. The classification is simple and rational. The abnormalities of secretion are treated of in connection with the consideration of the diseases in which they most frequently occur.

The chapter on dietetics is very complete and shows, as throughout the book, the authors' perfect familiarity with the extensive literature pertaining to their subject and their skill in sifting the facts. The importance of being acquainted with the methods of recognizing malignant disease of the stomach as early as possible has led the authors to devote considerable space and great care to the consideration of the significance and weight of each diagnostic point. From a surgical as well as from a medical point of view this is unquestionably the most important and valuable chapter of the book.

The authors have entered minutely into the therapeutics of ulcer of the stomach, giving also in detail the various methods in vogue and indicating the conditions requiring surgical interference.

The chapter entitled "The Vicious Circles of the Stomach" treats of the diseases of the other organs caused by gastric diseases; also of the secondary diseases of the stomach. Fifty pages are devoted to the careful consideration of this subject. This work is unquestionably a valuable addition to medical literature and deserves a prominent place among the recent publications on the diseases of the stomach.

J. FUHS.

CORRESPONDENCE.

THE SURGICAL OCCLUSION OF THE CEREBRAL SINUSES.

Editor ANNALS OF SURGERY:

KINDLY permit me to add a note to my article, "The Surgical Occlusion of the Cerebral Sinuses," published in a recent number of the ANNALS.

In enumerating the possible causes of failure of the establishment of the collateral circulation when a cerebral sinus has been ligated, I omitted mentioning one which, in its relation to the prevention of that result, is of such importance that a few words additional are justifiable.

More than pertains to the venous circulation in other parts of the body, the normal flow of blood through the venous channels of the brain is dependent upon the vigor of the aspiratory action of the thorax during inhalation, and consequently the depression of respiration, no less than cardiac weakness, which occurs during profound anæsthesia and shock, must have a marked effect in reducing the force of the cerebral venous current.

The appreciation of the importance of this factor in the maintenance of the collateral circulation forcibly emphasizes the necessity of avoiding respiratory weakness by the cautious administration of the anæsthetic, the prevention of shock, and the exhibition of respiratory stimulants, such as atropine. Voluntary efforts at deep breathing on the part of the patient during the first hours after the operation will also be of assistance.

I will also add that the method of gradual occlusion of a

sinus, suggested in the original paper, with a modified *technique* has a probable wider range of application to the surgery of the blood-vessels than was there intimated.

If experience shall prove the method practicable, any large blood-vessel whose anastomotic connections are comparatively meagre may be occluded with far greater safety than by the present methods of sudden closure. The importance of this in the surgical treatment of aneurism of the large arteries, as well as in other conditions, will be readily appreciated.

I am at present engaged in a series of experiments upon the lower animals to test the practicability of gradual occlusion. The outcome will, I believe, prove the feasibility of the method.

Respectfully,

R. T. STRATTON, M.D.

OAKLAND, CAL.

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AIR-DISTENTION IN OPERATIONS UPON THE BILIARY PASSAGES.

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SURGEON TO WESLEY AND GERMAN HOSPITALS.

SOME months ago it occurred to me that there would be many advantages in the inflation of the gall-tracts during operations upon them. The first opportunity I have had to apply the idea was in the following case:

Mrs. H. D., patient of Dr. S. A. Waterman, aged forty-six years, born in Germany, has always enjoyed such good health that, except for an attack of "peritonitis" at seventeen years of age, she has never needed the services of a physician until the present illness. Although married since the age of nineteen the patient has never borne children. Except for abdominal pain, relieved by heat, at Christmas time, 1897, there were no premonitory symptoms of the present trouble; there has been no sensation of weight or fulness in the hepatic region, no indigestion, and no inability to digest certain articles of food (Riedel).

On March 14, 1898, the present illness began, with loss of appetite, indigestion, and epigastric pain. These symptoms were readily relieved by medical measures. On April 7 the patient became ill again with anorexia, pain, and fatigue, and took to her bed. It was not until the 17th that pain became active and severe, and this exacerbation came on suddenly, to be followed by jaundice, which increased in depth steadily and slowly despite the use of the usual remedies for two months (until June 17). During this period the patient's condition varied from one of comparative comfort, with sufficient strength to enable her to take out-of-door exercise, to a state of depression and discomfort requiring absolute rest in bed. During the last ten days of this period the temperature was above normal, sometimes being as

high as 101° F., the pulse getting a little more rapid and the pain at times very intense. The jaundice became extremely deep, the urine bile-laden, and the stools quite acholic. At this time the patient was seen by Dr. A. R. Edwards, and it was agreed by him and Dr. Waterman that mechanical obstruction existed at the common gall-duct, and that surgical interference was imperative.

When I saw the patient, about June 16, she had evidently lost many pounds in weight, but was still not emaciated, her countenance was exceptionally bright and intelligent, but she said she had no further interest in life, although by nature she is optimistic. The skin was of a dirty brown or bronze yellow, indicating intense jaundice, the conjunctivæ were dark yellow; the lungs and heart gave no evidence of serious abnormal change.

Despite moderate intestinal distention the enlarged liver could be palpated below the costal arch. Its edge was thick but smooth. The gall-bladder could be felt, movable, and indistinctly fluctuating. Pressure upon it gave rise to pain.

Mechanical obstruction of the common duct was diagnosed, and, in addition, acute cholecystitis and cholangitis. On account of the weakness of the patient—but chiefly because of the jaundice, which, diminishing the coagulability of the blood, renders extensive operations hazardous, and because of the known presence of infection—I advised a preliminary drainage of the gall-bladder, and consequently of all the biliary passages, with the probability that a second operation would later be required in order to do away with the obstruction. There were no data by which the nature of the obstruction could be diagnosed. The absence of the usual symptoms of cystic cholelithiasis, and of the cutting, tearing, or grinding agony of a stone passing down the ducts, rendered the positive diagnosis of calculus impossible. Nor were there symptoms of a movable choledochus stone causing recurring attacks with obstructive symptoms. It seemed most probable we had to deal with a solitary choledochus stone, which had suddenly given rise to obstruction, on account of swelling of the mucous membrane as a result of infection. But a neoplasm, taking origin in any one of a number of circumjacent structures, could have given rise to the same condition, while even an inflammatory process could not be excluded.

The gall-bladder was drained on June 17 with the very efficient aid of Drs. Waterman, Weir, and Simpson.

The gall-bladder was found distended, with thickened oedematous walls, but with few adhesions. In order to quickly end the operation no exploration for the cause of obstruction was made. A gauze drain was placed in the abdomen below the gall-bladder; the gall-bladder, in which no stones were found, was drained with a rubber tube, and the abdomen closed. The operation was begun with a pulse-rate of 96, and the patient was returned to bed with a pulse of 110. Enormous quantities of bile mixed with mucus at once began to escape from the fistula. On one or two occasions, a few days after the operation, the fæces were so dark-colored it was thought bile was passing with the stools. The cholangitis, however, did not altogether disappear as a result of drainage, as was proved by the persistence of a large residue of jaundice, which at times deepened. This was thought due to inflammatory occlusion of the smaller hepatic ducts. It lends interesting confirmation to the case of Koerte, whose patient died of cholangitis, although bile escaped by a duodenal fistula, while the choledochus stone had been left in place.

Five weeks after the first operation the second operation was performed for the relief of the obstruction. Careful chemical examination of the fæces had shown no bile, but their gross appearance had previously indicated the presence of bile on two or three occasions when no chemical examination was made.

Operation.—Under ether anæsthesia the former vertical incision at the right of the rectus was reopened and enlarged, the adhesions about the gall-bladder separated, and, with a purse-string suture, the somewhat dumb-bell-shaped tip of an aspirator tube was fastened into the incision in the liberated gall-bladder. The union was not quite air-tight, but the leakage of air was not sufficient to interfere with the distention of the ducts. A small sterilized bicycle-pump was now attached to the rubber tube, and very cautiously and gently the tracts were distended. A hard lump buried in the hepatico-duodenal ligament had already been felt, and now the air-distention showed plainly that the cystic duct communicated freely with the common duct, which was in turn distended down to the seat of obstruction, now recognized as a stone. The slow escape of air into the duodenum proved that air could get around the stone even if bile could not do so. When pressure was quickly removed from the air in the ducts they could be seen and felt to collapse. Thus by palpation and by inspection the ducts could be instantly recognized and the opera-

tor be guided to the seat of obstruction. On opening the peritoneum over the choledochus, after inserting the fingers in the foramen of Winslow, the common duct containing the stone could be demonstrated in front of and free from all complication with the portal vein. The usual anatomical relations, as described in the text-books, were plainly evident. The slightly thickened duct was opened by an incision three-fourths of an inch long and the stone removed. The finger was then introduced into the duct, but did not pass upward or downward, showing that the stone was a fixed or immovable one. A uterine probe could be passed upward into the hepatic ducts, into the cystic duct, and downward into the duodenum. The ease with which this was done was due to the obliteration of the folds of mucous membrane by the air-pressure. Three fine silk stitches were then used to close the choledochus wound, the peritoneum of the ligament being inverted. The air-distention showed these to be well placed. A gauze drain was passed down to the seat of operation, a rubber drain inserted in the gall-bladder, and the abdomen was closed. Anæsthesia was maintained for one and a half hours. The patient had pain and gas-distention after the operation. Bile began to pass with the fæces on the sixth day, the delay being due, no doubt, to the freedom of escape by the gall-bladder fistula. No leakage occurred about the choledochus wound. On the sixth day the appetite was enormous, and the patient sat up in bed almost all day. Her progress after this was rapid and satisfactory. A biliary fistula in communication with the gall-bladder still persists. But Kehr's experiment of plugging the fistula (*Stoepsel's* experiment) gives rise to no discomfort, and I have no doubt the fistula can be easily closed.

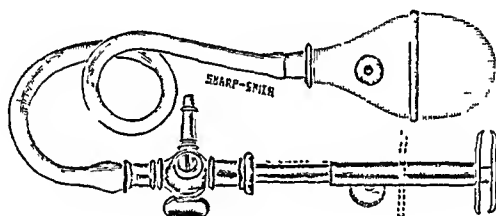
The stone, weighing forty-three grains, has the shape of an egg, except that it is flattened from side to side. Its diameters are twenty-four, sixteen, and fourteen millimetres. The broader end is deeply stained with bile, and about the middle of the stone pressure against the duct has worn a smooth band about it. As this band is farthest from the large end of the stone, which is bile-stained, and therefore directed towards the source of bile-supply, it is evident that accretion of the stone has taken place chiefly from the hepatic side, as would be expected.

This case has been reported in detail partly as an addition to the literature of choledochus lithiasis, as well as to

illustrate the principle and value of air-distention in operations upon these tracts.

In order to facilitate inflation I have had made by Sharp & Smith a small instrument consisting of a small rubber atomizer-bulb with a rubber tube attached to a suitable tip for insertion into the gall-bladder. The metallic extremity consists of a small metal tube at the end of which is a metal disk. The incised gall-bladder is drawn over this disk and held over it with a purse-string suture, quickly applied. Then the upper disk is slipped down over the part of the gall-bladder covering the lower disk, and is held in position by a set screw. A two-way stopcock at the side of the tube enables the operator to relieve the pressure in the ducts at will.

Even this little apparatus is not essential, as the surgeon can easily improvise a pump suitable for this simple purpose.



Every operator of experience has acknowledged the great difficulty of finding and recognizing the common duct, especially when adhesions are numerous and extensive. Under such circumstances it may be almost impossible to distinguish one structure from another after an hour or two hours of dissection, when every structure in view is in a stringy, bloody condition. If the stone has slipped under the liver in the hepatic ducts, or if the cause of obstruction is a scar or a small neoplasm, the recognition of the duct is extremely difficult. Under such circumstances probing has been frequently tried. But the difficulty of passing a probe around the folds of mucous membrane, even when the probe is the admirable flexible instrument of Fenger, is extremely great unless the tubes are inflated with air.

When inflation is practised the air acts as a probe, and finds its way quickly into every nook and cranny of the pas-

sages. The mucous membrane is thus flattened out against the distended duct walls, and if a probe is introduced through a small opening while the distention is kept up there will be but little trouble in searching with the sound for stones or strictures in all parts of the biliary passages.

Should no obstruction exist in the choledochus, the rapid escape of air into the duodenum may be controlled by pressure, either upon the duct before it opens into the intestine or by pressure upon the gut above and below the papilla.

No objection can be urged against the use of the air-probe, since its use requires but a moment's additional time-expenditure, and since the degree of pressure to inflate the tubes is very slight, in no way compromising the integrity of the duct walls.

In conclusion, it seems reasonable to predict the general use of air-distention in operations on the bile-tracts, because:

(1) It enables us quickly, safely, and absolutely to identify these tubes without overlooking any part of them. This is of especial advantage in the dissection of adhesions and neoplasms about the ducts.

(2) It enables us to readily locate obstructions.

(3) It enables us to approximately determine the degree of obstruction.

(4) It will facilitate the location of diverticula.

(5) It will guide us to perforations leading to abscess-cavities or to the free peritoneum.

(6) It enables us to open the ducts safely and without the fear of incising a collapsed vein.

(7) It enables us to sound the ducts for stone or stricture by passing the sound into the distended duct, either through the gall-bladder or through an opening in one of the ducts.

(8) It enables us to more effectually palpate the walls of the ducts both from without and from within.

(9) It gives us an ideal method of testing the accuracy of our sutures in the duct walls.

POSTPUERPERAL PSOITIS.

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THIS variety of septic infection occurs rather late after confinement, and may not be closely linked to that event by continuous septic symptoms. Dakin, of London, in a recent work, states that extension of infection may take place from the broad ligament to the connective tissue about the psoas muscle, and even along the course of that muscle up to the perinephric fat. He considers this a variety of remote parametritis, using the word "remote" as indicating distance from the uterus and not time from the delivery. He continues thus: "The cellulitic deposits in the cases of remote parametritis sometimes suppurate. They do so—if it happens at all—some weeks or even months after labor, and when this occurs along the course of the psoas muscle, it may cause considerable confusion, the collection of pus being liable to be mistaken for abscess due to caries of the spine.

As these cases have an insidious onset and also present an abdominal tumor, they may come to the notice of the general surgeon for diagnosis and treatment. The subject has received but scant attention at the hands of American and English writers and the literature is chiefly in French. I desire to present two cured cases of my own, and to quote in confirmation a more advanced case, with operation and autopsy, reported by Professor Villeneuve, of Marseilles, in the 1891 surgical histories of the Hôtel-Dieu of that city.

CASE I.—The first case came under my care at St. Mary's Hospital on April 4, 1896, referred by Dr. O. A. Gordon, who had seen her in consultation. She was a married woman, twenty-

six years of age, of good physique, and a native of this country. Her health had been excellent until her first confinement, which had taken place twenty-two days before admission to hospital. There had been no injury or accident. The physician who delivered her told us that the labor was prolonged and difficult, and that he had terminated it by the use of forceps during anæsthesia. He said that fever and prostration promptly followed, but that there was no abnormal vaginal discharge nor pelvic peritonitis. At the end of the first week pain began in the left side of the abdomen and the left thigh became drawn up. We have no record of the severity of the sepsis during these three weeks. We know, in brief, that she received malarial treatment during the first week, rheumatic for the second, while during the third week the question of hip-joint inflammation was under discussion. Then Dr. Gordon saw her for the first time and discovered the tumor.

On admission to hospital the patient was thin, anæmic, and weak. The heart and lungs were normal. The abdomen was relaxed, and no tenderness was noted except at the junction of the left lumbar and umbilical regions at the level of the iliac crest. This tenderness corresponded to a tumor about five inches long, two or three inches broad, and one or two inches thick; evidently situated deeply in the abdomen. It was hard, immovable, and did not fluctuate. The tenderness on pressure was decided. The mass could not be felt by the vaginal route, although the perineum was torn and the abdominal wall thin and relaxed. The uterus showed the recent delivery. There was no discharge noted and the pelvis seemed free from peritonitis. All the joints were normal in contour and motion, except that extension of the left thigh was limited at 130 degrees. Any attempt at forced extension beyond this point caused severe pain in the left side of the abdomen. All other motions of this hip-joint were normal. There was no evidence of spinal osteitis.

During the four days she was kept under observation there was no change in the local signs. The bowels moved easily and the temperature ranged between 100° and 103° F. Several examinations of the urine failed to show a kidney lesion. We made a diagnosis of psoas abscess or an intraperitoneal inflammatory mass in contact with the psoas muscle.

On account of this uncertainty I made an incision along the

outer side of the left rectus muscle directly over the tumor. There were no peritoneal adhesions in the abdomen or pelvis. On holding aside the intestines a retroperitoneal fluid mass was evident. To avoid infecting the peritoneum the peritoneal layer of the abdominal incision was then sewed with a continuous catgut suture, and from the centre of the abdominal incision, and perpendicular to it, a second incision was made, extending to the anterior superior spine of the ilium and in depth to, but not through, the peritoneum. Then with the fingers I stripped back the peritoneum from the iliac fascia, and going through the fascia thus gained access to the pus without infecting the peritoneal cavity. About four ounces of pus were obtained and a necrotic cavity in the psoas muscle easily demonstrated. Free drainage was provided by gauze and two rubber drainage-tubes, and the wound partly closed.

The patient made a good recovery. The temperature was normal in one week, the wound healed in four weeks, and the thigh extension had reached 160 degrees. She remained in hospital six weeks more, during which time the extension became normal. She walked without a limp, and was in good general health when discharged. In June of this year, two years since leaving hospital, she was in good health without a limp, and no spinal disease has developed.

CASE II.—This patient was also twenty-six years of age, and in excellent health until her first confinement, which occurred on January 11, 1898. She was delivered by the high forceps operation, the Tarnier instrument being used, and considerable force employed. For one week the history is uneventful. During the second week septic symptoms developed, and on the twentieth day after delivery she became delirious. An unsatisfactory curetting was done, on February 1, by her physician without influencing the sepsis, for the temperature was 105° F. and the pulse 118, and a foul vaginal discharge was present on the following day. She now came into the hands of Dr. W. H. MacNamee, to whom I am indebted for this history. He did a second curetting and removed a handful of necrotic tissue. Antiseptic irrigations were instituted, and after four days the temperature reached 100°, but did not become normal. From February 10 to 20 she was out of bed, but she did not gain in strength, and an evening temperature of about 100° was present. From

February 20 to March 1 she was in bed most of the time, on account of general weakness, and the evening temperature ran a little higher. On March 1 a gynæcologist gave her an anæsthetic with the expectation of opening a pus-sac. However, he was unable to locate it, and did not operate, although convinced that pus was somewhere present. Retention of urine was noted the next morning, but as it did not recur, I think it was due to the anæsthetic. During the first week in March the temperature fluctuated between 102° and 103° , and she complained of pain in the back, an inability to extend the right thigh, and a local tenderness in the region of the right kidney. It is worthy of note that there was no complaint of local tenderness and drawing up of the thigh until the seventh week after delivery.

I saw her first on March 9 with Dr. MacNamee. She was then pale and prostrated with the general appearance of sepsis. She rested in bed with her right leg drawn up nearly to a right angle. The lungs were normal. The heart had a characteristic anæmic murmur. Her abdomen was relaxed and seemed normal, except on the right side, in the region of the kidney. Here marked tenderness existed, and on careful palpation a tumor was recognized that was continuous with the spinal column towards the middle line. This mass was about six inches long. Its upper border could not be felt. The lower border was indistinct, but it seemed to terminate above a line drawn transversely through the umbilicus. Its outer border could not be distinguished from the kidney. In brief, it resembled a kidney tumor, except that it did not present as clearly towards the back as such tumors usually do. All motions at the hip-joint were normal except extension. The slightest attempt at forced extension produced severe pain in the right side of the abdomen. A careful examination of the spine and inquiry into her history before confinement failed to detect disease in that quarter. It was my belief that this case was one of acute psoitis with the primary source of infection at the time of confinement, and I therefore sent her to the Brooklyn Hospital for operation.

The temperature on the morning of operation was 101.8° F., and the pulse 114. The urinary examination showed a trace of albumen, but no abnormal deposits. Considering my experience

with the first case, it did not seem necessary to make an abdominal incision to confirm the diagnosis.

I made the usual lumbar incision for operations on the kidney and exposed that organ. There was no suppuration in the perinephric fat. The kidney, which was of normal size, was explored with an aspirating needle with negative results. With one hand on the abdomen and the other in the wound the tumor could be recognized as being on a plane with the kidney and nearer the spinal column. Two fingers were then passed behind the kidney and onward towards the spine. Fluctuation could be felt, and on breaking through a layer of fascia (the psoas sheath) with the fingers about four ounces of pus was obtained. The cavity was irrigated and two rubber drainage-tubes, half an inch in diameter, were inserted behind the kidney into the cavity and stitched to the posterior edge of the skin incision.

On the fourth day the temperature became normal; but as the cavity was a difficult one to drain satisfactorily, she occasionally had some fever for several weeks, and the sinus did not close until the eighth week. At no time did urine appear in the wound nor pus in the urine. Extension of the leg steadily increased and about the fourth week after operation became normal. She was discharged cured on June 11, without a limp, and much improved in general health. This improvement has continued, and not the slightest indication of a spinal lesion has developed.

I am permitted, also, to include in this report the details of two other cases observed by Dr. Robert L. Dickinson. These are as follows:

Puerperal Psotitis; Operation before Abscess-Formation.—This patient had been septic after her first child. In her eighth delivery, after podalic version, the large hydrocephalic head was perforated through the mouth. The uterus had been ruptured through its anterior wall (so that three fingers would slip into the bladder easily), probably by previous attempts at forceps extraction. The lower uterine segment was enormously elongated and thin, the contraction ring being above the navel, the highest location of which I can find any record.

Later this patient became profoundly septic, so that she was

in grave danger of her life. The tear, as predicted, had taken care of itself and the fistula was closing. The broad ligaments showed infiltration, but above the pelvic inlet on both sides of the promontory were considerable indurated masses. I operated on the fifteenth day, by free incision parallel to Poupart's ligament and the iliac crest, lifting up and following behind the peritoneum. On both sides brawny, necrotic, darkly discolored areas were opened up, which reached below from the edge of the inlet on its outer posterior side along the psoas muscle, half way to the kidney. No pus was found. Large quantities of fluid drained away in the next few days. The improvement was not as rapid as when an abscess is opened. It never is rapid after an operation where the septic focus is thus diffuse and the patient in a typhoid state. A slow recovery followed. The legs were held in a flexed position, but never rigidly fixed.

Psoas Abscess following Tubal Pregnancy.—Mrs. F. S., aged twenty-six years, had had three children. She was last unwell four months before October, 1892, when she was first seen. Her temperature was 105° F., and there was evidence of a large abscess cavity on the right side of the pelvis. Free incision evacuated a large amount of pus and a putrid foetus four and one-half inches long. The tubal pregnancy had become a broad-ligament gestation, and had become infected. It was seen that the ramifications of the abscess cavity ran into the iliac fossa, but it was not until four days later that it was certain there must be an undrained pus collection farther up. Another incision was then made above the right anterior spine and the cavity clearly mapped out. The uterine douche-tube passed to the diaphragm, behind the peritoneum, twelve inches, then it would pass from this opening across the pelvis in front of the sacrum nearly as far, and, lastly, along the abdominal wall, almost to the median line. Prolonged packing and washing gave excellent results. In two months the patient had no psoitis and had regained her strength, but some flexion of the thigh persisted. She cannot now stand entirely upright. This patient's condition was characteristic. As in many of these puerperal septic cases wherein pus is found at considerable distances from the original focus,—the pus was not walled off, but lay, as it were, in sheets beneath the fascia, and thus dissected its course a long way.

As no report of a lesion is entirely conclusive without

an autopsy, I desire to quote in brief a case reported by Professor Villeneuve showing a more advanced stage of the same process.

The history of his case before admittance to the hospital is meagre. The second week after delivery a drawing up of the left leg appeared, with pain in the left side of the abdomen, radiating to the left chest and down the leg. After three months of fever and confinement in bed she tried to walk, but was unable to extend the leg. Her condition on admittance to the hospital, in the beginning of the fourth month after delivery, is recorded as follows: The left leg flexed and rotated outward, and the slightest attempt at forced extension caused extreme pain. Abdominal palpation showed a large fluctuating tumor occupying the left iliac fossa, extending upward along the left side of the spinal column and downward under Poupart's ligament, tapering in both directions. By vagina the tumor could be recognized high up on the left side when firm pressure was made from above. Her general condition was poor, and a pronounced evening temperature was present during the three days she was under observation.

A small incision below Poupart's ligament evacuated two litres of pus. A sound was passed up the muscle sheath and a counteropening made in the back. General sepsis continued with the development of bed-sores and a parotid abscess, and death thirty-seven days after operation.

At post-mortem nothing abnormal was found in the peritoneal cavity. The adnexa were perfectly healthy except for slight adhesions. The uterus was larger than normal and its cavity contained a little yellow mucus. On injecting water by the inguinal incision, the whole psoas-iliacus muscle-sheath became distended, together with sinuses in the back, and also the hip-joint by way of the bursa beneath the psoas tendon. The psoas-iliacus muscle, in its entire extent, was a putrid mass infiltrated with pus. He concludes his report in these words: "The autopsy made it clear that the principal lesion was well limited to the body of the psoas-iliacus muscle, which was totally destroyed. The other lesions were plainly secondary. Notwithstanding the existence of a vast iliac pouch, there was no peritoneal lesion."

He goes on to state that these cases should be called "psosis" and a plain distinction made between them and the more common intraperitoneal infections. He considers this an infectious myositis that is a complication of the post-puerperal state as surely as any other variety of puerperal infection. He affirms that in this case and other similar ones it is not possible to invoke another cause of infection, and that the rôle of traumatism can be entirely excluded. He refers to a contribution by Marcano, who insists that there is a traumatic origin present, and states that he does not accept that theory.

Dr. Skene, in his "Treatise on the Diseases of Women," under the title "Pelvic Cellulitis, with Certain Complications, which, so far as I know, have not been noticed or described heretofore," describes two cases which are interesting in this connection. They both showed septic symptoms not explained by the findings in the pelvis, a lateral abdominal tumor, and flexion of the thigh. One was three, the other four months after delivery. In both an abdominal section was made and then closed as the pus was found to be retroperitoneal. Both were drained by an incision in the loin. The first, after a desperate struggle, recovered to such an extent that she left the hospital with a small sinus still discharging and an advancing phthisis. The second died the third day. Autopsy showed the psoas abscess well marked, and the remains of a cellulitis in the broad ligament that had resolved. There was no intraperitoneal lesion, nor vertebral disease.

Having established by the above clinical and post-mortem facts that this condition exists and gives characteristic symptoms, it may not be out of place to theorize briefly concerning its etiology and to note the points of differential diagnosis.

I regret that I have no bacteriologic data to offer concerning these collections of pus. It is well established, I believe, that most of the cases of puerperal infection are due to the streptococcus. Yet, according to Bulloch, various

investigators have shown that in certain cases the gonococcus, the staphylococcus, the bacillus coli communis, or other less frequent organisms are the cause of the sepsis. From the clinical stand-point one would judge that the streptococcus was not the cause of these abscesses in the psoas muscle on account of the subacute course of the inflammatory process.

In brief, there are two theories, one that a rupture of muscle fibres has occurred with a hæmatoma and secondary indirect infection at this point of lowered resistance; the other, a direct infection of the cellular tissue around the muscle by way of the lymphatics.

Clark, in the *Transactions of the New York Medical Association* for 1886, Vol. ii, pp. 70-84, in an article entitled "Psoitis and Peripsoitis," gives the opinion as follows: "Primary suppuration in the psoas muscle always results from rupture of muscle fibres occurring during violent exercise, straining in parturition, gymnastic exercises, an attempt to avert a fall or a direct blow." He then gives a detailed history of three cases where the traumatic etiology is self-evident, but in none of them is there any connection with the puerperal state. He thus offers no evidence in support of his statement that it occurs as the result of "straining in parturition." Yet his traumatic cases present the same clinical history as the post-partum cases.

In considering the second theory, we lay aside the usual type of puerperal infection,—viz., a pelvic peritonitis. We also note that in the cases reported there are two varieties, one, when there has been plainly an infectious process in the uterus and the cellular tissue of the true pelvis; the other, where there has been no clinical evidence of such a pelvic lesion, but the psoas abscess has been practically the only local sepsis. In a similar way we see septic fingers and secondary axillary abscesses both with and without an intermediate local lesion in the arm.

The lymphatics of the lower segment of the uterus descend, together with those of the vagina, and pass backward

to enter the internal iliac chain of lymphatic glands, which in turn connect with the mesial group of lumbar glands lying along the aorta and vena cava. This mesial group has most intimate connections with the lateral lumbar glands, lying behind the psoas muscle and in the intervals between the slips of muscle arising from the transverse processes of the lumbar vertebræ. The lymphatics from the upper segment of the uterus proceed outward in the broad ligament and, following the ovarian vessels, empty into the mesial group of lumbar glands. Thus we see that an infected tear of the vagina alone, or of the cervix, can directly infect the cellular tissue about the psoas muscle without an intervening metritis or cellulitis of the broad ligament. This would seem to be a rational explanation of my first case where there was no pelvic lesion or vaginal discharge, and also of the case with autopsy from the French literature. The other cases would seem to be examples of infection passing through the lymphatics going in the broad ligament with a metritis and cellulitis and the psoas abscess as a secondary infection. The relation of the forceps to these remote septic lesions and also whether the high forceps can injure directly the psoas-iliacus muscle through the thinned-out uterus are questions of interest to the obstetrician.

In reference to diagnosis we can speak more definitely. Given a knowledge that acute psoitis may occur, I think the diagnosis is an easy matter. Septic symptoms with the history of a recent delivery suggest a pelvic examination. This gives a negative result. Then examine the whole abdomen instead of assuming that a constitutional disease is present. Localized pain and swelling will be found on one side, and together with a flexed thigh means a retroperitoneal lesion. The tumor may be indistinguishable from the kidney. If it is a kidney, we should expect a previous cystitis and a urinary examination, or better, several examinations will usually show a "surgical kidney." A blocked ureter may restrain the kidney *débris* and the urine be clear even with a pus-kidney. However, a lumbar incision is indicated for both conditions.

A perinephritic abscess may be excluded by its presenting more emphatically towards the loin. I think there is some confusion between a true psoas abscess and a suppurative process in the fat around the kidney. The latter gives a brawny feeling, and even redness of the skin when the infection is not a tubercular one.

However, it is more important to exclude the common tubercular abscess arising from spinal caries, for the prognosis is far different, and, in my judgment, at least, the treatment should be also. Even in these aseptic days I think it the rare exception, and not the rule, that a psoas abscess complicating spinal caries should be incised, for practically it seems to be impossible to avoid a mixed infection of the sinus during the long period required for the arrest of the bone lesion. As the collection of pus is in the same location in both instances there is no difference in many of the physical signs. The acute psoitis is tender while a collection of tubercular *débris* is painless until infected with the pus organism. Our reliance must be in a careful history and examination of the spine, for the osteitis precedes by many months the collection in the psoas sheath. This osteitis always manifests itself by symptoms, such as slowness in rising, early fatigue, a muscular rigidity giving the characteristic attitude, and pain referred to the peripheral ends of the corresponding nerves, and thus described as being felt in the abdomen, chest, or limbs. The so-called "quiet" disease, without marked symptoms, is not the variety that produces an abscess, but is rather a dry osteitis. The characteristic deformity is also to be expected before the onset of a psoas collection.

We must exclude that variety of appendicitis which produces a lumbar phlegmon. I have this summer seen a case of gangrenous psoitis with a two months' subacute history, where the autopsy showed the origin of the infection to have been in the appendix. Although this variety is exceptional, it is worthy of careful consideration. Appendicitis

in general has recently been recognized as being the cause of postpuerperal sepsis to an extent not hitherto imagined.

Concerning treatment, I have nothing new to offer. The two cases, drained in different ways, are not sufficient data to formulate a rule concerning the best location at which to approach a small psoas abscess.

In conclusion, I would say that these cases simply reaffirm the well-known fact that deep pus unrecognized proves fatal. I have reported them as an aid to such recognition, for I believe that the condition is not widely known except among advanced obstetricians. It is my impression, however, that these cases are not uncommon.

HOT AIR IN JOINT-DISEASES.¹

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My experience with the use of superheated air has extended over a period of two years, and has embraced a wide range of conditions of the joints, with failure, disappointment, partial successes, signal benefit, and in some cases results that were thoroughly gratifying.

The exaggerated statements that are sometimes made would lead one to believe that hot air will absolutely cure every known lesion, but after continual disappointments have accompanied efforts to cure incurable conditions, one naturally finds that certain conditions appear to be benefited and others undoubtedly relieved, while there are a few that are really cured.

The ovens that I have used are the Betz and the Lentz make. The Betz oven is heated over an alcohol lamp, with a three-inch sheet-iron pipe communicating the heated air directly from the lamp to the interior of the oven, direct contact with the patient being avoided by a shield running the length of the oven. A vent-hole in the top of the oven controls the flow of heated air, which is still further controlled by a damper in the sheet-iron inflow pipe. A thermometer is inserted through the top of the oven into the interior. The part to be heated is, after thorough wrapping, placed within the oven upon a canvas support regulated so that it will be approximately equidistant from the sides of the oven.

¹ Read before the Philadelphia Academy of Surgery, November 7, 1898.

During my earlier experience with this oven I met with two accidents, neither of which proved serious, although sufficiently alarming at the time. The first one was caused by the open lamp, nearly full of alcohol, upsetting while lighted, and spreading flames on the floor. Fortunately, the patient had not yet had her arm put in the oven, otherwise her skirts could not have escaped. Immediately after this I abandoned the open alcohol lamp, and used a small gas stove with equally satisfactory results, and without the danger attending the use of alcohol.

The second mishap occurred while using alcohol, and was caused by the flame passing up through the ingress-tube and setting fire to the cotton wrapping around the patient's leg. The draught-hole in the top and the damper were immediately closed, which smothered the fire, and the patient's leg hurriedly withdrawn from the oven. The oven in cases of application is usually placed upon a chair, so that the distance from the top of the lamp to the patient's leg is only about twelve inches, which will account for the flame shooting up with the direct draught and igniting the inflammable cotton. Since the above accident I have always used flannel instead of cotton.

The Lentz oven is arranged for gas, having Bunsen burners underneath, heating a metal plate which is in contact with the bottom of the oven. In this apparatus the flame cannot enter the interior chamber or come in contact with the patient, but when the bottom becomes red hot, it is possible to scorch or burn the patient, as I found in several cases before I abandoned the use of cotton. Three patients have been burned or, more properly speaking, scalded, in the use of the ovens in the hands of myself and my assistants. They have all occurred after the ovens had been in use for about a half hour, and were, I believe, due to the cotton becoming saturated with perspiration, which, becoming hot, scalded the patients. This has never occurred since I have used flannel to envelop the limb and exercised

the utmost care to avoid the accumulation of moisture within the oven.

Recent experience has shown the great value of humidine, a preparation made by the Pennsylvania Salt Manufacturing Company for the purpose of absorbing moisture in refrigerators. While the proper use of the ventilation-holes in the Lentz ovens does much to get rid of the excess of moisture, resort to them too frequently cools off the interior to a sufficient extent to make it difficult to obtain and maintain the highest degree of heat. The higher degrees of heat cannot be borne by a patient if the parts are wet, and very excessive wrappings about the limb prevent the heat from reaching the parts, therefore the use of humidine greatly facilitates the use of the oven in that it avoids the danger of scalding the patient and permits the use of lighter wrapping of flannel.

I have in my possession one other oven that was used extensively, more than forty years ago, by an irregular practitioner. It is a double-sleeve arrangement, the space between the sleeves being made to permit the passage of steam around and in contact with the interior sleeve, thereby heating the interior cavity into which a patient's limb is inserted. The limb, after being inserted, is held in place by a rubber enveloping and constricting arrangement to make the cavity air-tight. A small tube communicating with the interior cavity is provided, so that by means of an air-pump a partial vacuum is obtained and maintained around the limb. By means of the air-pump the excess of moisture is, of course, removed, but as steam at 212° F. could not heat the interior cavity above that point the patients were unable to obtain the benefits that are now ascribed to the use of temperatures approaching 400° .

I have found it expedient to have the personal attention of a physician during the time of use of the oven, for there is great room for discretion in its use. It has usually been found impossible to have the patient bear the heat of over 300° to 320° at the first sitting, and I cannot say whether

or not the patient is influenced by the mental astonishment at the audacity of using a higher degree of heat than steam, which is known to be destructive. The second application is usually accompanied by no untoward events, and this may be based upon the placid condition of the patient having passed through the first ordeal without being cooked or scalded, and with sufficient appreciable benefit to be encouraging to the hope of ultimate recovery.

Acute sprains of the knee, ankle, wrist, and elbow have appeared among the most favorable cases when seen shortly after injury, and excellent results have been obtained even after a considerable time has elapsed. A typical illustration is afforded in my own person. In falling from my bicycle I struck the palm of my hand in the position that so often results in a fracture of the lower end of the radius, but which, in my own case, caused only a very severe sprain. Within an hour I placed the hand in the oven, carrying the heat to 380° , during an hour, and repeated it in twenty-four hours. Pain subsided while in the oven the first time, and entirely disappeared at the second. The wrist was kept quiet for thirty-six hours, and no recurrence of pain or inconvenience has occurred. The well-known use of hot water in similar cases was the cause of my resorting to the oven in this case, and with most gratifying results.

My greatest disappointments have been in cases of both acute and chronic gout, rheumatism, and rheumatoid arthritis. I have not only not been able to relieve to any appreciable extent the pain or modify the evidence of inflammatory action, but in a large number of cases the existing conditions seemed to be made worse by the heat. In but one case was there decided relief from pain obtained, and in that one there was a possibility that the condition was not that of a beginning acute attack of rheumatism. The patient had for years been subject to acute inflammatory rheumatism, running from joint to joint, with a period of subsidence of one year. Awaking one morning with what appeared to be a recurrence in the wrist, the presumption was that this was

the beginning of one of the severe attacks so greatly dreaded. The oven was used for an hour, the temperature gradually rising to 380° F., during which time the severity of the pain gradually subsided, until at the end of the hour the wrist was entirely painless, and there has been absolutely no recurrence for three months.

Hydrarthrosis appears to offer a field of usefulness, in that the effusion often rapidly disappears, either because of the local sweating or by the increased power of absorption; the tension upon the joint being removed, the pathological process which caused the effusion is placed in a favorable condition for resolution. I have found that rather lower degrees of heat, kept up for a longer time at each sitting, produced the best results, and, by comparison, I should suggest the use of a temperature of about 300° continued for two hours. The use of a degree of heat of 380° to 400° for one-half to one hour, while well borne by patients, did not produce an equal amount of sweating, and therefore did not appear to me to be as beneficial as the lower temperature mentioned. I have found it impossible for the patient to bear the pain of the high heat of 360° to 400° when the parts are wet with perspiration, while the lower degrees, ranging from 250° to 300°, are easily borne, without inconvenience even when the enveloping flannels are saturated. It, therefore, is apparent that for sweating purposes high degrees of heat are not applicable, and are apt to be followed by more or less severe scalds.

Fibrous ankylosis is the field that I have found the most susceptible of benefit from the application of extreme heat. Joints that have become more or less firmly ankylosed as a result of acute inflammatory and traumatic synovitis, or from disuse following an injury, appear to soften under the high degrees of heat, very much in the same way as old glue will soften when heated. This softening of bands of adhesion is often most marked, as evidenced by repeated experience in breaking up ankylosed joints. While the parts were at the accustomed temperature the joints would often appear

to be ossified. An hour with the temperature starting at 300° and rapidly running up to 380° to 400° , with occasional ventilation to get rid of the excess of moisture from perspiration, was almost always followed by such a change as to enable manual efforts alone to move the joints 10 to 15 degrees, and by powerful mechanical appliances to 20 to 45 degrees, and it must be noted with comparatively little pain either at the time or following. It has not been an unusual occurrence to have patients walk several squares immediately after a stiff knee has had free motion imparted to it from 20 to 45 degrees. Within an hour after heat and manipulation some of the former stiffness would recur after the first two or three applications, but gradually with the full co-operation of the patient and the re-establishment of muscular co-ordination, the freedom of the joint increased. Fifty applications, made upon alternate days, has been the greatest number in recovering ankylosed joints, and this was in a case of an ankylosed knee of two years' standing. It is not to be expected that a normal joint can always be reproduced, but it is a decided gain over an absolutely stiff joint to have even 5 degrees of motion.

Numerous failures have occurred in cases of ankylosis which have been broken up and a considerable amount of motion obtained, but in many the manipulation was sufficiently painful to require more courage than the patient possessed. The rapid and transitory anæsthesia by ethyl bromide has been employed, and a painless passive motion instituted after the use of the oven, but occasionally the subsequent pain was unendurable and the treatment abandoned.

Under the heading of ankylosed joints may properly be mentioned the cases of inveterate flat-foot that have yielded to correction by the use of high degrees of heat, approaching 400° F., and followed by powerful mechanical manipulation. Many of these cases have had corrective pressure by means of a screw applied to the extreme point of endurance, and it has been astonishing to witness the efforts of patients to stand even more pain from mechanical force as they witness

the arch of the foot being reformed, and they realize that their disability is gradually disappearing.

A large experience with the oven in cases in various stages of tubercular disease of the bones and joints inclines me to view this method favorably, although time enough has not yet elapsed to make definite statements as to its permanent value. It appears, however, to be a rational deduction that the softening process that enables a fibrous ankylosis to yield, and the rapid disappearance of effusion about a joint would present favorable conditions for absorption and repair in tubercular invasion. The necessity of maintaining immobilization must not be overlooked, and the well-known favorable results and absolute recoveries produced by immobilization without the use of the oven naturally induces a hesitation to credit the oven with the benefits accomplished when both methods are employed.

I believe that decided and appreciable benefit has been obtained in tubercular arthritis by recourse to the highest degrees of heat, but when sufficient time has elapsed to justify a definite statement based upon time and results, the presentation of the subject will be other than it must necessarily now be,—a preliminary consideration.

The subject under discussion may be summarized as follows:

(1) The highest temperature (370° to 400°) is possible only when the patient is well covered with flannel and the moisture kept to a minimum.

(2) The highest temperature is applicable to ankylosis and tubercular joints.

(3) The lower temperature (250° to 300°) is of use in sweating, and may be maintained for two or three hours daily.

EMPLOYMENT OF THE NEEDLE-HOLDER WHEN- EVER IN SURGICAL OPERATIONS SUTURING IS REQUIRED.¹

By OSCAR H. ALLIS, M.D.,

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ONE of the frequent remarks of the elder Gross was that "*the mechanical constitutes but a small part of surgery.*" He looked upon the causation and destructive effects of disease, its diagnosis and medical treatment, as worthy of the profoundest attention of the surgeon, but he looked upon the details of a surgical operation as something that should not engross one's attention, and concerning which no true surgeon would ever make a boastful display.

Were the eminent surgeon permitted to return to his former field of labor nothing would surprise him more than some of the palatial operating rooms, or to watch the details of an operation as performed in modern surgical practice. And while this would surprise him greatly, another matter would equally attract his attention,—viz., that in surgery there is no longer the former distinction between major and minor operations, but, unlike the surgery of former days, the utmost care and surgical detail are bestowed upon the opening of the simplest abscess, the passing of a catheter, the extraction of a tooth, or the vaccination of an infant. Formerly major operations found a limit when in amputations the surgeon severed the arm or thigh from the trunk, now the surgeon claims the entire human being as his rightful field of labor, never hesitating to enter where disease must be overthrown or accident repaired.

¹ Read before the Philadelphia Academy of Surgery, October 3, 1898.

In marked contrast with the feeling held by the earlier surgeons, in which the details of surgery were assigned to a subordinate place, the surgeon of to-day does not hesitate to go before an association of the foremost surgeons of his age, and tell them the relative advantages of some new needle, or mode of preparing a ligature, or a special antiseptic for the hands. That which at one time would have been regarded as a trifle is now raised to its true importance, for nothing that contributes to success, nothing that will contribute to disaster, can be looked upon as a trifle.

With the advancement of surgery has followed, step by step, the ubiquitous statistician, who can tell you the percentage of deaths from every surgical operation, while a commendable rivalry has sprung up among surgeons with a view to trying how far death can be cheated out of his prey, and when death comes when he triumphs, the surgeon asks why, and assigns three general causes,—one shock, a second ether intoxication, a third sepsis,—three great causes of death, and these the modern surgeon feels that he can control, and when for any cause he does not control them, he places the blame where it belongs, not upon the patient, but upon himself, his assistants, or his nurses. To avoid shock, to limit, as far as possible, the period and amount of ether, the modern surgeon bends every energy to detail. He is ready the instant anæsthesia is reached, and with boldness, but not rashness, penetrates to the very heart of the mystery.

While my subject does not permit me to enter into all the details of an operation, there is one general aspect of it that claims attention,—viz., repair. The bistoury can divide, but it cannot do more. It cannot arrest hæmorrhage or close the wound. Upon the latter the immediate and future welfare of the patient depends. How often hæmorrhage from a deep vessel in the abdominal cavity persists because the operator has not the skill to use an instrument or because he has not at hand the proper instrument. How often prompt and permanent repair is defeated by lack of skill and care in the readjustments of separated tissues. The medical student

leaves his alma mater with the certificate that he has taken special instruction in operative surgery, but formerly, and I fear at the present day, the repair of his work, the careful suturing, the management of the needle and suture, the needle-holder had no part in his course: he was taught to cut and saw and bandage, but not the beautiful plastic work of repair,—the part that will be upon exhibition so long as the patient lives.

It is claimed by some eminent surgeons of the present day that Adam had in his possession the best needle-carriers ever invented, and that he has transmitted to posterity an inheritance that cannot be improved upon. Hence many modern surgeons employ the fingers and thumb for all superficial suturing, and only resort to artificial helps when the damage to be repaired lies in some deep cavity; apparently oblivious to the fact that it is under these circumstances that their greatest manual skill is required, and unless by practice they have acquired that skill their operation will be prolonged, much to the disadvantage of their patient or, as not infrequently happens, will be defective and result in failure.

But I take exception to the statement that Adam possessed the best pair of needle-holders. Certainly, if his equipment was complete, there would have been no room for a thimble. To the tailor and seamstress, who make a living by the needle, as well as the lady whose artistic piece of embroidery rivals the pencil of the artist, the thimble is an absolute necessity.

With the surgeon the toughness of the fabric that he must mend—viz., the human skin—demands some special advantage. He must have a thimble or a pair of forceps, or the needle itself must have cutting edges, piercing and cutting as it is forced through the tissues; and those who boast that they do not require a needle-holder must confess that they have favorite needles. Cutting needles always leave permanent traces of their havoc, and should never be used in surgery of the face.

The difficulty of suturing in deep cavities has puzzled

surgeons for many generations. Certainly the management of a needle in the jaws of a needle-holder in clefts of the palate or in suturing the tough uterine tissues presents many obstacles, and many skilful surgeons have abandoned needle-holders in these operations and employ special long-handled needles with eye at the point to be threaded after the tissues have been pierced.

Of needle-holders there are scores that possess great excellence, and between which no just discrimination can be made. I am not writing to suggest a new instrument, I am rather making a plea for the mastery of instruments already in our hands, and for that mastery the means lie at our doors. Not in actual surgical practice, for few surgeons will average a score of sutures a week, but rather in a harmless, painless drill in just such handiwork as has engaged our mothers, wives, sisters, and daughters in what would otherwise have been misspent time. I would seriously recommend, to the young surgeon especially, that he take a few lessons in embroidery. He will find the outlining stitch so easy that he can acquire it in a few moments; but while it can be learned in five minutes he will find that to work his monogram or the initials of his name neatly on an office towel, to do it quickly and with ease, he must devote many a spare moment; but these spare moments had better be spent upon a towel than that he fall short of skill when it shall be needed in a surgical operation.

Should the surgeon not think this suggestion beneath his surgical dignity let me make a still further suggestion. If one watch a fair needle expert upon her embroidery, he will find that she shifts it with every change in the figure,—sometimes having her work upsidedown, at others by the side. The surgeon must educate himself to overcome this obstacle. To him the light enters often from one window, and he finds that he can neither shift the light nor his patient. Then it is that he wishes that he could take his needle-holder in his left hand. As a practice, then, I have myself embroidered without changing the position of my work,—work-

ing with either hand from right to left, from left to right, towards me and from me, as most convenient, and while at first I found it toilsome and awkward, I felt that it was only necessary to persevere, when the mastery, or if not the mastery, a commendable degree of excellence would be acquired.

I have thus far said nothing of the management of the thread. One may watch an accomplished needle-worker for hours and never note a tangle or a catch of the thread. But, alas, this cannot often be said of the surgeon, who, though he may have but a few sutures to use, these few by a perversion and obstinacy almost demoniacal, will kink, twist, get caught around hæmostats, or pull out at the wrong time, and thus give rise to delay that may add seriously to the final result.

My plea, then, is for the mastery of the needle-holder, for its universal employment, and I especially urge upon the younger surgeons the employment of spare moments in attaining ambidexterity with this instrument.

TWO CASES OF HYPERTROPHY OF THE PENIS; ONE DUE TO TRAUMATISM; THE OTHER, TO ELEPHANTIASIS.¹

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THE origin of hypertrophy of the penis is not yet understood; from cases that have been reported to the medical profession, the disease would seem, in some manner, to be associated with injuries to the lymphatic vessels. Robert W. Taylor gives an account of a case where the organ grew to the length of eleven inches, the circumference being proportionately increased after the individual had received a gunshot wound of the lymphatic vessels of the groin. Many instances of hypertrophy of the corpora cavernosa have been detailed; in the *Medical Times* for January, 1875, there is the case related of a man thirty years of age. The organ had commenced to enlarge, when the individual was a boy of six years of age; the integument over the penis being normal.

In the case of the person who came under my charge enlargement seemed to follow traumatism; its history is briefly as follows:

He is an acrobat, thirty-eight years old. Has always enjoyed good health; his family history is negative so far as abnormalities, tumors, or malignant diseases are concerned. Has

¹ Read before the Philadelphia Academy of Surgery, November 7, 1898.

never had any venereal disease. At the age of twenty-five the organ was of normal size. He is married and his wife has borne him two children.

Shortly after his marriage he observed that when he donned his tights, in which he appeared during his exhibitions, that his appearance was quite unseemly. In order to rectify this condition, he devised a harness so adjusted that he could strap the penis to the scrotum between his testicles. For several years he utilized this apparatus when he appeared in the ring; but frequently when performing his gyrations the organ would become twisted, causing pain, tenderness, and swelling, lasting for several days, followed by a subsidence to his normal condition.

After using the apparatus for the space of two years he observed that the organ was increasing greatly in size. This condition was unaccompanied by pain. Finally sexual congress became impossible. Some three weeks before presenting himself at the hospital while attempting to turn professional somersaults with the organ strapped between his legs the foreskin was wrenched, bruised, and slightly chafed; this condition was followed by inflammation and oedema of the prepuce, with suppurating periadenitis of both groins. He begged to have amputation of the penis performed, as the size and weight of the organ had become so great that it was impossible for him to carry on his business.

The penis was of gigantic size; it was of normal shape; the enlargement was uniform; the skin perfectly smooth and healthy, moving freely over the subcutaneous connective tissue. There was no tenderness on pressure. There was an acquired phimosis, with enlarged suppurating glands of both groins. The length of the organ from the pubis to the end of the prepuce was ten and one-half inches; the circumference at the middle of the body was nine and three-quarters inches. (See Fig. 1.)

The patient was circumcised, and on removing the foreskin an enormously developed but perfectly healthy glans was brought into view. The tissue forming the foreskin was normal, and no more bleeding took place than was natural. The glands of the groin were removed without difficulty. Microscopic examination of the foreskin discovered nothing abnormal. The individual recovered promptly from the effect of the operation without any untoward result.



FIG 1 —Hypertrophy of the penis due to traumatism

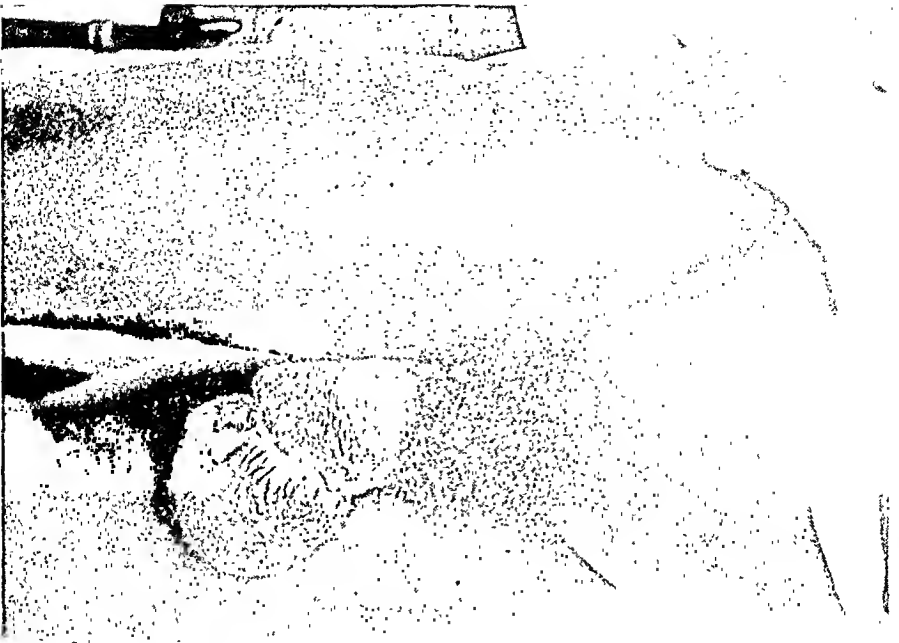


FIG. 2.—Elephantiasis of the penis, before operation.



FIG. 3.—Showing result after removal of hypertrophied tissue in case of elephantiasis of the penis.

The differential diagnosis between hypertrophy and elephantiasis of the penis was readily made in this case. The organ had preserved its normal shape, and was symmetrically enlarged; the skin was smooth and normal in appearance and not attached to the subjacent structures, while in elephantiasis there is always hypertrophy of the fibrous structure as well as of the subcutaneous connective tissue; the skin being thrown into numerous furrows running in longitudinal directions and crossed by other furrows which divide the skin into firm, brawny, and elastic nodules. Finally, in elephantiasis the glans is not enlarged, and is generally hidden in the lobular skin of the prepuce, presenting an umbilicated appearance.

ELEPHANTIASIS OF THE PENIS.

Elephantiasis is rarely met with in America or Europe, but sporadic cases are occasionally seen. In the tropics, however, it is often found, and is frequently endemic to certain districts, attacking the organs of generation of both sexes, next in frequency after the lower extremities.

The disease appears to be a hypertrophy of the fibrous tissue of the skin and subcutaneous connective tissue, attacking the last-named structure first. This is followed in time by an increase in the size of the neighboring organs, disturbing the circulation, and giving rise to chronic inflammation of the lymphatic vessels of the part.

It is very unusual for elephantiasis to attack the penis primarily, but it frequently follows involvement of the scrotum. Dr. Thin, in the *Transactions of the London Pathological Society*, 1880, gives a case of elephantiasis of the penis, where no appearance of a multiplication of cells by division could be detected under the microscope, and hence infers that the whole of the cells are derived from the white blood-corpuscles. Lewis, Bancroft, Manson, and Henry have of late years pointed out that elephantiasis, if not caused by, is at least frequently associated with, the presence of a parasite, the *filaria sanguinis hominis*, of which there are three varieties,—*filaria diurna*, *filaria nocturna*, and *filaria perstans*. Of these three

divisions it is probable that the *filaria nocturna*, which gives rise to certain forms of elephantiasis as well as the conditions known as lymph-scrotum and hæmatochyluria, is the most common. The embryos in tropical cases are present in the blood in large numbers at night and almost entirely absent during the day. Stephen Mackenzie asserts that if the patient sleeps during the day and is awake at night the condition is reversed. Osler states that these parasites cannot be found in every case of elephantiasis, and reports two cases coming under his own observation where *filaria* in the exuded fluid or in the blood at night could not be detected. He further observes that the majority of cases of elephantiasis which occur in this country are non-parasitic, while the directly opposite condition pertains in cases occurring in China. The parasite is found principally in tropical climates, and, according to the observations of many American writers, it exists extensively in the Southern States. The *filaria sanguinis hominis* appears in the blood in its embryonal form, and is fully developed only in the lymphatics.

The scrotum is more frequently the seat of the disease than the penis; this organ, as a rule, being affected secondarily. Two cases are reported involving the penis alone, one by R. W. Taylor and the other by R. F. Weir, of New York. In Taylor's case the patient was a young Hebrew, in whom the condition followed an injury to the organ. In Weir's case the hypertrophy followed a stricture of the urethra associated with an abscess resulting in a urinary fistula.

The history of the case which came under my care is briefly as follows:

The individual was a colored man, about forty-five years of age; sailor by occupation. Family history negative. Patient states that he never had any venereal disease. About six months before coming to the Philadelphia Hospital, while at sea, having abstained from sexual intercourse for four months, he noticed a small, slightly elevated, hard lump, about the size of a pea, on the left side of the frænum. This lump increased slightly in size, became irritable, and ulcerated at the base, from the necessary

friction produced by coming in contact with the clothing. Gradually sloughing set in until the tumor hung by a strip of skin which he cut through with a pair of scissors; the resulting raw surface healed rapidly. About three weeks later the entire penis began to enlarge until it gradually reached its present dimensions. He has never had any pain or experienced any difficulty in urination. He has lost slightly in weight.

On examination the glans penis was small and almost entirely hidden by a firm fibrous mass which entirely surrounded the end of the organ. Between the penis and the scrotum there was a distinct line of constriction, the skin of the latter being perfectly normal. The left testicle was easily discovered, but the right testicle could not be found, and was supposed to have undergone atrophy. The skin of the penis was cut up into furrows, running longitudinally, which were crossed by others running more or less obliquely, dividing the organ into lobules, which were hard, firm, and elastic. (Fig. 2.) From the pubis to the glans penis, along the dorsum of the organ, the measurement was eleven inches. The circumference of the mass in its thickest portion was nine and one-half inches. On palpation a distinct doughy sensation was imparted to the touch, but there was no pitting on pressure. A very careful study of the blood was made by my colleague on the staff, Dr. F. P. Henry, but the *filaria sanguinis hominis* could not be detected. The patient's temperature was normal. Sexual power was completely lost. Examination of the urine negative.

The patient was etherized and an incision made along the entire length of the dorsum of the penis, being about ten inches in length. The skin was found to be tough and fibrous, and, on division, a thick, white, elastic, fibrous tissue was exposed, it was impossible at first to identify either the corpus cavernosum or spongiosum. To guard against wounding the urethra a small-sized bougie was passed into the bladder. The tough fibrous tissue was then dissected entirely away from the penis, when a strong thick band was found passing along the entire length of the under surface of the organ, which was formerly attached to the central tendon of the perineum. On removing the fibrous mass from the vicinity of the base of the penis, the missing testicle was found pulled up out of place. It was dissected loose, and replaced in the scrotum. The hæmorrhage, which was not so

profuse as had been expected, was easily controlled by means of hæmostatic forceps, and very few ligatures were required. After the operation an ordinary antiseptic dressing was applied, and the body of the penis allowed to granulate. The complete healing of the wound occupied four months, at the end of which time the patient had entirely recovered. On examination, after recovery, it was found that the newly formed skin was tightly adherent to the body of the organ which held the penis in a horizontal position. The patient stated that he was in perfect health and that sexual powers were completely restored.

A brief abstract from the interesting pathological report, made by Professor H. F. Harris, is herewith appended.

"On microscopic examination the epidermis covering the diseased area is found greatly thinned and the epithelial ridges are almost entirely destroyed. Here and there, however, thin rods of epithelium, which are evidently the remains of these ridges, project down for a short distance into the true skin; the cells of which these rods are composed contain much, almost black, pigment, and they do not react to either basic or acid aniline dyes. Just beneath the epidermis there are numerous rounded masses of more or less entirely keratinized epithelial cells. They are sometimes in contact with the epidermis, but more generally seem to be quite free in the derma proper, without any connection with the epithelial layer. While the cells of which they are composed are in most instances keratinized, in some cases the cells which form the outer boundaries of the masses still preserve the morphologic and staining peculiarities of the younger cells, sometimes those cells are piled upon each other several deep. The epithelial cells of the epidermis, as a rule, preserve their normal size, shape, and general relation to each other, but they do not stain as readily as normal cells. In addition to this, many cells in the prickly layer are swollen to twice the normal size. The protoplasm of these cells is homogenous and takes acid stains faintly, the nuclei stain feebly or not at all. Occasionally a leucocyte can be seen between the cells. The layers of cells which form the deeper portions of the Malpighian layer are almost black from the presence of a dark-brown pigment; the pigment is so dense that the peculiarities of the cells in this situation cannot be made out with certainty.

"The greater part of the tissue is evidently from that part of the penis upon which no hairs occur, but in sections from one of the pieces a few were observed. No changes in the shaft could be made out. The cells of the inner cells of the outer root-sheath are plainly in a state of degeneration; their nuclei stain faintly or not at all, and their protoplasm is faintly colored by the acid dyes. Even the outer cells of the outer root-sheath are elongated and their nuclei are very irregular in form. The cells of the sebaceous glands present more nearly a normal appearance than any of the other epithelial structures, but they are in many cases elongated and take stains poorly.

"Sweat-glands are only occasionally found. The coils are often separated from each other by dense masses of cells. These cells will be referred to later.

"The true skin is enormously hypertrophied. This is principally due to an increase in the amount of collagenous tissue, but not in an inconsiderable degree to the presence of collections of cells around the blood-vessels of this tissue. The collagenous tissue occurs in thick bundles which are almost invariably disposed in planes parallel to the skin surface. In the deeper portions of the skin wall defined fibrils of elastic tissue are often found; they are in general run from the deeper layers of the skin towards the surface. At intervals through the tissue comparatively large, robust bundles of involuntary muscle fibres occur. They are not probably of a new formation, but result from the hypertrophy of the pre-existing muscle of the parts. In the true skin, extending downward for a considerable distance, there are numerous small, very dark pigment masses, generally of a rounded or irregular form. These granules may be seen in the process of formation from the lower layer of the epidermis.

"The blood-vessels are comparatively scant, but those which are present present interesting changes. Contrary to the observations of others, I have found the changes in the arteries much more pronounced than those in the veins. The alterations in the latter consist principally in a marked dilatation of their calibre; in addition to the endothelial cells lining their inner coats shows a marked decrease in their power of taking stains, and in some cases they do not stain at all. Rarely the outer coats of these vessels show marked thickening, and in almost every instance are more markedly cellular than normal. The arteries are all small,

and very frequently their lumen is encroached upon by thickening of their walls, and in these instances the intimas are represented by a structureless hyaline membrane which takes the acid stain. The muscular coats are rarely so stained that their true nature can be recognized. Replacing the muscular coat in many of the vessels are collections of cells which have the appearance of lymphoid cells; sometimes these masses of cells exactly occupy the muscular area, but in other cases they encroach upon the intima and push it inward. The adventitiæ of the vessels are in most instances decidedly thickened, and contain lymphoid and plasma cells. The entire walls of some of the vessels are hyaline; here the intimæ are generally swollen. Occupying the lumina of some of the arteries are yellow, entirely homogeneous masses which take acid stains, but no basic ones, and would appear to be hyaline thrombi. None of these were seen in vessels whose walls were hyaline, but were frequently observed in those the muscular walls of which were infiltrated with cells.

"The perivascular lymphatics are almost always greatly dilated and contain collections of lymphoid and plasma cells; within these collections of cells, usually near their edges, mast-cells frequently occur, but no pyonuclear leucocytes were found.

"Between the bundles of collagenous tissue, and having no apparent connection with the lymphatics of the blood-vessels, are often collections of cells which in every way resemble those just spoken of; whether they are only a part of these masses cut so as not to show the vessels or entirely separate could not be determined. Scattered through the tissue generally plasma, lymphoid, and mast-cells are of frequent occurrence. The tissues are abundantly supplied with characteristically branched connective-tissue cells. None of the cells mentioned are elongated or twisted, as would be supposed to be the case had they been subjected to considerable pressure. A careful study of the section failed to reveal the presence of micro-organisms.

"Attempts to study the nerves of the tissue by Golgi's silver method were unsuccessful, as, is often the case, impregnation did not occur."

(The photographs of these interesting cases were kindly taken for me by Professor Henry W. Stelwagon.)

THE ANATOMY AND SURGERY OF THE FRONTAL SINUS AND ANTERIOR ETHMOIDAL CELLS.

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(Concluded from page 109.)

Treatment.—Acute Cases.—During the acute stage of inflammation of the frontal sinus there are no direct local measures which will be of much benefit, and in many instances attempts at internal local treatment will do harm.

The ordinary analgesics for neuralgic pain will not relieve many cases, and in certain severe attacks opiates must be used. Occasionally the coal-tar products—phenacetin, acetanilide, etc.—may be of some benefit, and no harm will come from giving them a trial.

It is not a good plan to use nasal irrigations during any stage of acute inflammation. It is not desirable, also, to inflate the nasal cavity after the method of Politzer. These procedures may spread infection in various directions.

It is desirable to reduce the nasal congestion as much as possible, with the idea of relieving obstruction at the ostium frontale, which is probably œdematous, and not sufficiently open to allow the frontal sinus exudate to escape.

It is a good thing to apply cocaine to the vicinity of the infundibulum and turbinate fossa, either as a fine spray or on a pledget of cotton carefully adjusted. This may relieve the congestion sufficiently to allow the exudate to escape, and it will relieve the pain for a time. An oily spray with

menthol is cooling to the patient, and tends to relieve congestion.

External applications of cold to the frontal area may be followed by good results.

It has been suggested that forcible inspirations, with the anterior nares closed, will produce a negative pressure in the nasal fossa, with the idea of thus aspirating the exudate from the sinus. This can never overcome marked stenosis of the ostium frontale, but may be of some value in certain instances.

Any treatment that will improve the condition of the general nasal cavity, when acutely inflamed, will probably help resolution in the frontal sinus.

Chronic Cases.—The treatment of any given case of chronic suppuration of the frontal sinus will depend upon the nature and complex of symptoms presented.

In general, treatment may be classified as follows:

(A) Intranasal treatment.

(1) By means of the natural canal between the sinus and the nasal cavity, using the probe and irrigation canula.

(2) By perforating the floor of the sinus.

(B) External operations.

(1) On the anterior sinus wall.

(2) On the inferior sinus wall.

(3) Complete removal of both of these walls.

(C) Both of these methods may be combined by entering the sinus externally and making a large opening into the nasal fossa.

(A) Intranasal Methods of Treatment.—(1) *Probing the Frontal Sinus; Use of the Irrigation Canula.*—These methods are of value in diagnosis as well as in treatment, and, first of all, it will be advisable to consider the evidence as to the possibility of probing the frontal sinus.

Jurasz was one of the first to attempt this mode of treatment, and in 1887 he published a series of twenty-one cases, including both normal and pathological sinuses. He claims to have succeeded as follows: Five times the probe entered

the sinus easily. Six times the probe entered with difficulty. Ten times the probe failed to enter.

Schutter attempted to treat these cases by means of irrigation, and reports two successes.

Hartmann, Gruenwald, and Jansen make use of the probe and canula for diagnosis, but they consider this method of questionable value in treatment.

As to the possibility of probing the sinus, opinions are at great variance. We have, on the one hand, the results of clinical evidence, and, on the other hand, the results of study and experiments on the cadaver.

Various results obtained by different observers are as follows:

Hansberg says that on the cadaver he was able to probe half of the cases. He uses a probe one-half millimetre to one millimetre thick, bent at an angle of 125 degrees thirty millimetres from the end. He measures off five centimetres on this probe to correspond to the distance from the floor of the sinus to the lower part of the anterior nares.

Zuckerkindl observed that it was very difficult to pass a probe from the nose to the sinus on the cadaver, and this conclusion is the result of an enormous experience.

Réthi gives a report of twenty-six cases, stating that he could probe six of them.

Katzenstein says there are many hinderances to passing the probe.

Winckler says he could probe one-sixth of the male and one-quarter of the female cases.

Ziem says that probing and syringing the frontal sinus yield doubtful results.

Cholewa says that he can probe 60 per cent. of the cases with the Hansberg probe.

Hartmann thinks 50 per cent. of all cases can be probed, and adds that nasal irrigation will cure most of the cases if the ostium frontale is free.

Herzfeld is emphatic in declaring that we cannot often pass a probe to the sinus without injury to the anterior ethmoidal cells.

Alezais speaks of various obstructions which prevent passing a probe to the sinus.

Kuhnt and Schech say they have never succeeded in passing the probe to the sinus and been sure as to the exact location of the end of the instrument.

Engelmann says that he could probe half of the cases.

Killian was successful in only a small percentage of the cases.

Lichtwitz experimented with thirteen sinuses (cadaver), and failed to enter in only three instances. He uses a probe one and a half to two and a half millimetres thick, bent at a right angle ten centimetres from the end. He states that the probe should enter the nose for a distance of seven to eight centimetres in order to be certain that the sinus has been entered. He admits that occasionally we cannot avoid entering some of the ostia belonging to anterior ethmoidal cells.

Of seven cases treated by irrigation, all were relieved of the subjective symptoms, but only one absolute cure as regards the nasal discharge. Only after the failure of nasal treatment would he resort to the external operations.

It will be observed, therefore, that results and opinions differ widely concerning the possibility and practicability of treatment of frontal empyema through the natural opening of the sinus. Some authorities believe that the sinus can never be probed with certainty, others declare that at least 60 per cent. of the cases are amenable to this mode of treatment. The probes devised and lauded by one operator are condemned by another; the solutions successful in one case fail in the next.

Anatomical Evidence.—The ability or inability to pass a probe into the frontal sinus will depend upon anatomical formations in the first instance, and, secondly, the result will vary with the presence or absence of pathological changes.

Two hundred and fifty sinuses and their approaches have been examined with reference to the conditions which favor or prevent the passage of the probe to the frontal

sinus. In the first place it is absolutely necessary that the operator should be very familiar with the regional anatomy in order to get the best results.

Examinations have been carried out on the following plan:

(a) Probes of different lengths and angles were passed through the anterior nares towards the sinus, and their position noted later.

(b) Portions of the middle turbinate bone were removed later, if found to act as an obstruction.

(c) The relations and variations of the uncinate process and ethmoid bulla were noted wherever they interfered with the passage of the instrument.

(d) The various ostia into which the probe was liable to pass were noted.

(e) The size, location, and plane of the ostium was noted, together with variations in the size and shape of the surrounding ethmoidal cells.

(f) The thickness of the various portions of the floor of the sinus.

(g) The various methods of approach to the ostium frontale.

(h) The necessary measurements for the two arms of the probe.

In Part I the regional anatomy has been given with sufficient detail, and only general results will be briefly considered here.

It was found that the passage of the probe through the nares with the turbinate bone undisturbed was attended with many difficulties, and one could never be certain that the distal end was in the sinus. Although it seemed to be buried to a great depth, the end was frequently found only in a very prominent frontal bulla or a long cell running exteriorly along the posterior border of the sinus, or in only a single compartment of a nearly divided sinus. These points can never be determined on the living subject by nasal examination.

It was found that removal of the operculum of the middle turbinate made exploration easier, but the greatest gain was made when an incision with the scissors (Plates 29, 30) enabled one to remove more of the anterior turbinate with the snare. Still more space was gained by removing a little more of the upper wall of the turbinate, as shown in most of the sagittal sections. As shown in Plate 30, the posterior portion of the turbinate need not be disturbed, so that it is really unnecessary to remove much of the turbinate bone as a whole.

This procedure is of almost absolute necessity in treating these cases, in order to give the pus a free outlet of escape. The region of the infundibulum and turbinate fossa is frequently obstructed with polypi and hypertrophies, which may be the sole cause of the persistence of the suppuration. This upper portion of the turbinate is removed most easily by means of punch forceps.

The ethmoid bulla is only exceptionally an obstacle after the turbinate has been properly excised. It is posterior and inferior to the field of operation. It may be a hinderance to the flow of pus, however, if it is sufficiently developed to close the hiatus semilunaris.

The uncinate process is an important landmark in probing the sinus. Where the ostium frontale opens into the nasal duct, which, in turn, must pass to the infundibulum, the end of the probe must pass over the upper border of the uncinate process to reach the infundibulum. Hence it is easy to see that the shape and position of the process are of great importance. It may prevent our entering the infundibulum.

Having entered the infundibulum, we must pass through a naso-frontal canal of varying length, according to the width of the septum referred to (Part II), as passing between the uncinate process and the infundibulum. This canal may be straight, curved regularly in any direction, or it may be very crooked, in consequence of anterior ethmoidal cells crowding the canal in one or the other direction.

Hence the canal may offer no obstruction, or may prevent the passage of the probe to the sinus, provided no injury is done. In probing the sinus it is advisable to bend the probe in different directions, until finally it may be possible to enter the sinus.

Thus far we have considered the conditions where the ostium opens into the infundibulum *via* a naso-frontal canal, and the probe must pass through the hiatus semilunaris. This group will include a little less than half of the cases, and are by far the most difficult to treat.

About 53 per cent. of all cases have no naso-frontal duct, and then the ostium frontale opens into the turbinate fossa (Part I) by means of little or no canal. These cases are much easier to probe, for the point of the probe passes up under the middle turbinate bone, far forward, as high as it is possible to go, and the ostium is somewhere along the apex of the fossa. (See plates with probes, etc.)

During life it is usually impossible to differentiate these very different types of approach to the sinus, on account of the small size of the region under consideration and its inaccessibility. If the clinician succeeds in passing a probe into the sinus, it is probably a case of the second type, and the probe has not entered the infundibulum. The removal of the upper extreme portion of the turbinate is particularly efficacious in allowing these cases to drain. On the cadaver, more than half of these cases could be probed, but very frequently the angle and length of the probe had to be altered for different sinuses. Where a naso-frontal canal existed probing rarely succeeded.

A common barrier to the progress of the probe was the existence of ostia of ethmoid cells, which may be numerous in the vicinity of the ostium frontale. If such a cell is entered, further progress in that direction means injury. A frontal bulla may be entered in a similar way.

During life it is impossible to decide where the point of the probe may lie, and on the cadaver the uncertainty is nearly as great. The slight variations in distance, in any given case,

from the anterior nares to the upper anterior ethmoidal cells, on the one hand, and the frontal sinus, on the other hand, are at least equally balanced by the individual variations. Hence no absolute measurements can be of much value, and will serve only as a general guide.

The probes devised by Hansberg and Lichtwitz are equally valuable.

Obstructions or hinderances to the passage of the probe may be summarized as (1) variations in the middle turbinate bone; (2) variations in the uncinate process; (3) large ethmoid bulla; (4) small or crooked naso-frontal canal; (5) protruding ethmoid cells; (6) ostia of ethmoid cells; (7) pathological hypertrophies.

If a probe can be passed, then we should attempt to irrigate the sinus with some very mild solution, such as a normal salt solution or a 2-per-cent. boric acid solution. Strong astringents are harmful.

The question as to when nasal treatment is to be adopted, and the length of time it should be continued, is an important one. Some authorities declare that extensive suppurations in the frontal sinus never get well under this mode of treatment. If such be the case, then delayed external operation is a loss of time, and it should be resorted to early. But there is ample evidence to show that nasal treatment may give satisfactory results. If a complete cure does not follow, the subjective symptoms are often relieved, and the preliminary operations in the nose add to the success of the external operation.

The only complaint may be on account of the annoying discharge from the nose, and on this account it is better not to subject the patient at once to the risk and disfigurement of an external operation.

Every attempt to pass the canula will not be crowned with the same degree of success, and the element of chance is considerable. Accurate notes of the route, hinderances, and all peculiarities of each case should be kept, as well as the angle and curve of the probe. If the symptoms are not

very troublesome, weeks or months may be given up to this treatment. If the symptoms indicate that the probe does not enter the sinus, after all possible obstructions have been removed, then it is a waste of time to delay the external operation.

(2) *Perforation of the Floor of the Sinus.*—This procedure was done first by Dieffenbach and later by Tillaux. In recent times it has been revived by Schaeffer and championed more or less by Winckler, but condemned strongly by most authorities.

As suggested by Schaeffer, the instrument is to perforate the floor of the sinus median to the middle turbinate bone.

Schaeffer publishes a series of twenty-five cases, of which he says that eighteen were cured. Winckler reports fifteen cases, with six cures.

On the cadaver, Winckler experimented with sixty-six sinuses, and was successful in entering thirty-five sinuses. He failed in twenty-two instances, on account of the thickness of the bone on the floor of the sinus, which averaged from two to five millimetres near the median line. In sixteen cases the floor was thick near the median line, but thin externally. With one exception the instrument entered the sinus anterior to the ostium frontale.

Engelmann experimented with ninety-seven sinuses and could puncture only seven times, according to Schaeffer.

Lichtwitz, in similar experiments, succeeded in three out of twelve sinuses. In eleven cases of empyema he concluded that he entered the sinus three times, judging from the length of the probe. Great resistance caused him to desist in seven instances, and an alarming case of collapse led him to abandon the procedure.

Mermod reports a fatal case of meningitis where the instrument perforated the lamina cribrosa.

An examination of a large number of sinuses shows that it is possible to perforate the floor in the great majority of instances according to Schaeffer's method, when the parts

are exposed on sagittal section, but in the natural state this is a most difficult, uncertain, and dangerous procedure.

In the first place, it is extremely unsurgical, for we are working in the dark and performing a dangerous operation. We are very liable to meet an impassable bony wall, or to perforate the lamina cribrosa. We are internal to most of the anterior ethmoidal cells which may be the seat of the greater part of the trouble. An ordinary perforation would not give satisfactory drainage, and the sinus itself is never open to direct treatment by this dangerous method.

From an anatomical point of view, it is much more rational to perforate the floor of the sinus just external to the middle turbinate going through the anterior ethmoid cells. There is more available space and the locality is a little less dangerous. On account of the probable association of suppuration in the anterior ethmoidal cells with frontal sinus suppuration, it may be a good thing to perforate these cells. There is danger of entering the orbital fossa. Killian, Jurasc, and Hartmann rather favor this procedure.

Although less dangerous than the puncture internal to the middle turbinate, both of these methods are too dangerous, as well as offering but little hope of relieving the condition, to be of any permanent value.

They are not in conformity with surgical methods, and possess but little therapeutic value.

If the removal of nasal obstructions and attempts to relieve the conditions by irrigation *via* the natural opening fail, then we should consider the advisability of the external operations.

A few considerations in regard to the treatment of suppuration in the anterior ethmoidal cells.

Before discussing the various external operations for the treatment of frontal empyema, it will be necessary to consider very briefly the treatment of suppuration in the anterior ethmoidal cells. The reason for this is obvious

when we consider the frequent associations of these processes.

Bearing in mind the anatomical relations, we recall that there are several groups of anterior ethmoidal cells, all of which are either under cover of the middle turbinate bone or are above and external to it. Hence, in order to accomplish much by way of nasal treatment, it will be necessary to remove a portion of its anterior extremity. After this preliminary step, we may possibly be able to see the bulla ethmoidalis, which represents the lowest of these cells and usually the largest. It is the most distant from the floor of the frontal sinus and probably less frequently affected than the other cells. Its protruding eminence can be removed by means of punch-forceps, the burr-drill, or the curette without much danger. With great care, it may be possible to reach the cells just above the bulla. On account of hæmorrhage, it is usually necessary to employ several sittings in order to accomplish this object.

Most of the anterior ethmoidal cells are located in the upper portion of the ethmoid bone, filling in the floor of the frontal sinus and extending backward from its angle to reach other cells, called posterior ethmoidal, on account of the location of their ostia, and then they extend downward to meet the cell or cells which form the bulla ethmoidalis. These cells are comparatively small and numerous, and when once involved, suppuration is probably general throughout them all. They lie just internal to the inner wall of the orbital fossa, may extend up between the laminæ of the orbital portion of the frontal bone, and consequently are just inferior to the lamina cribrosa.

These cells are practically inaccessible to nasal treatment, on account of their location and the consequences which may follow operation, and, in connection with the frontal sinus, they are the cells most frequently involved. The parts are concealed by the first hæmorrhage, so that further operation would be unwise, hence many sittings are requisite. Distances cannot be judged carefully on account

of monocular vision and the inaccessibility of the cells, so that the natural consequence is a perforation into the cranial or orbital fossa, even without the knowledge of the operator at the time.

Just behind and above the bulla ethmoidalis are certain large posterior ethmoidal cells, which can usually be treated with safety intranasally, but externally and above we run the same risk as in operating upon the anterior cells. However, the posterior cells do not concern us particularly.

Hence, intranasally, only a very small portion of the anterior ethmoidal cells are accessible to treatment within the bounds of safety, whereas the cells commonly associated with frontal sinus empyema are beyond the reach of intranasal surgery. Attempts to curette them by this route are too dangerous and are in every sense "unsurgical." All that can be done safely is to remove the anterior extremity of the middle turbinate as high as possible, and curette the cells in or about the immediate vicinity of the bulla ethmoidalis.

The safest and most radical mode of treating the anterior ethmoid cells will be considered later.

Suppuration in Middle Turbinate Cells.—If such a condition is suspected, resection of the requisite inferior portion of the turbinate bone is all that is required. The lower portion of the cell is thus removed, and it can no longer retain pus. If necessary, its cavity can be curetted.

(B) EXTERNAL OPERATIONS ON THE FRONTAL SINUS.

Before resorting to external measures it must be carefully decided for each individual case whether such a step is necessary. Certain acute obstructive cases demand an external operation at once, in order to avoid possibly a fatal complication, but most cases are not urgent, and the advantages to be gained by nasal treatment more than outweigh the disadvantage occasionally consequent on delay.

Most patients will refuse the external operation, if proposed at once, particularly the extreme radical operation aimed at obliterating the sinuses. Most external operations

result in considerable deformity, which is a considerable objection to the radical operation, wherever the empyema symptoms are not very annoying. All things considered, it is best to attempt to relieve the symptoms by intranasal treatment as described above, and if this fails, we can resort to more radical measures.

On the other hand, aside from certain acute complications, there are cases where it can be decided at once that it will be useless to expect to derive much benefit from intranasal treatment, cases where we can be certain at the outset that only radical measures will be of benefit. In general, cases complicated with external objective signs rarely recover without external interference. This is due not only to sinus complications beyond the reach of intranasal surgery, but also to the associated empyema of the anterior ethmoidal cells, which can be safely and thoroughly curetted from in front, either through the orbital fossa or with better satisfaction, all things considered, through the floor or inferior wall of the sinus.

Under this group should be included all cases complicated by fistulæ, and most of the cases of mucocele, also most of the cases complicated by abscess-formation about the frontal sinus.

The indications for some external operation may be tabulated as follows:

(1) Where the intranasal treatment has failed to accomplish the desired end.

(2) To remove the element of danger, particularly in acute cases.

(3) To avoid drainage into the cerebral fossa in suspected perforation of the posterior wall of the sinus.

(4) To remove the mechanical symptoms consequent on the presence of a tumor from any cause.

(5) For profuse, persistent, often fetid, nasal discharge.

(6) To relieve pain in certain cases.

(7) Whenever there is an external fistula, which fails to close, after a reasonable length of time.

Having determined upon some external operation, there are numerous questions to be decided. We may enter the sinus from the anterior or inferior wall, or combine both of these routes. We have then to decide whether we will depend solely upon external drainage without disturbing the floor of the sinus, or whether we shall make an opening down into the nose and then close the wound of entrance, or, finally, whether both external and internal drainage shall be combined. Some surgeons are still more radical, and believe that the sinus must be obliterated. The question of the extent of curetting, also, is open to argument.

Let us examine these various procedures as carried out by operators who have had the most experience.

The earliest external operations were performed on cases complicated by fistula, but these were not commonly followed by cure.

In 1838, Riberi enlarged the communication of the sinus with the nasal cavity.

Péan was early to advise thorough curetting of the mucous membrane.

The modern operations date from 1884, with the method advised and practised by Ogston. He made a vertical median incision, four centimetres long, starting from the root of the nose and passing upward. The skin and periosteum were reflected laterally and the frontal bone trephined in the median line, thus opening both sinuses simultaneously. A trocar was then passed into the nasal cavity in the vicinity of the ostium frontale and the opening enlarged. The mucous membrane was then curetted, swabbed with a zinc chloride solution, and a drainage-tube, the size of a "crow's quill," inserted, and the external wound closed. He reports two successful cases.

With this operation, serving as a general type, we have numerous modifications, but, nevertheless, many radical differences.

Schmidt makes an incision along the eyebrow from the angle of the orbit and reflects flaps up and down. He makes

a small hole into the sinus with a chisel, examines with the probe, and then acts according to circumstances. He passes a trocar into the nasal fossa, uses the curette on all the sinus walls, and leaves a gauze tampon in the sinus.

Schech would make this same incision with the same general treatment, and he takes occasion to add that intra-nasal treatment offers but little encouragement.

Gruenwold follows this same incision, particularly for anterior ethmoidal suppuration, but for frontal sinus cases he makes a nearly vertical incision parallel with the corrugator supercillii muscle, starting below about midway between the median line and the supraorbital notch. He separates the skin and periosteum, chisels a small hole into the sinus, and injects sterile water in order to make sure that he has entered the right sinus. The sinus should then be explored with the probe, the opening enlarged, the mucous membrane curetted, the nasal opening curetted, if necessary, and the sinus packed with gauze. He does not believe in closing the external wound. He reports that he gets very little scar.

Silcock and Dundas Grant advise the external operations, but do not curette the opening into the nasal fossa. They advise passing a small wire through the naso-frontal canal and over it a small rubber tube, if possible, to act as a drain.

We come now to the more radical operations. Nebinger advises removal of the whole anterior wall of the sinus. He incises from the naso-frontal suture of the affected side along the supraorbital arch beyond the supraorbital notch, exposes the bone at once, and reflects the periosteum above, chisels a small hole, examines the extent of the sinus with the probe, and acts accordingly.

If conditions call for the radical operation, he erects a vertical incision four to six centimetres long, just to one side of the median line, raises this triangular flap so as to expose the entire anterior wall of the sinus, which he removes as extensively as possible. He probes the ostium frontale and cures the vertical portion of the sinus last, on account of

hæmorrhage. He endeavors not to injure the interfrontal septum, but if it is perforated, he removes it in toto.

He cures the opposite sinus from this same opening, if accessible, otherwise he extends the horizontal incision across to the opposite side. He approximates the vertical incision but drains at the inner end of the horizontal incision.

The essentials of this operation are (1) complete removal of anterior wall; (2) complete curetting of entire mucous membrane followed by immediate tampons; (3) enlarging the nasal opening, but depending mainly on external drainage.

Krecke and Fehleisen depend mainly upon external drainage.

Jansen's operation consists essentially in removing the inferior surface of the sinus and making a large opening into the nasal fossa. His idea is to obliterate the sinus by allowing the orbital fat to fill its cavity. He makes an incision along the supraorbital arch, and separates the orbital periosteum well back into the orbit. He then proceeds to remove the orbital and nasal portion of the floor, and, in cases where the sinus is large, he removes a strip of the lower border of the anterior surface from one-fourth to one-half centimetre wide. He cures a large hole into the nasal fossa, thereby removing the anterior ethmoid cells in the vicinity of the floor of the sinus. He maintains that he can thus inspect the antrum and sphenoid sinus as well as the anterior and posterior ethmoidal cells.

The operation is liable to give rise to considerable disturbance in the orbital fossa, and frequently requires several months for healing. Where the sinus is small, good results are obtained, but if it be large, the progress is slow and the deformity may be considerable.

Kuhnt is even still more radical in that he removes both the anterior and inferior walls. For simple cases, determined by exploration with the probe, he removes the orbital portion of the floor near the internal angle, but if the sinus

is large, he erects a vertical incision at the inner end of his horizontal one, turns up a flap of skin, and then removes, completely, the anterior and the inferior surfaces of the sinus. Then he bevels the sharp edges of the sinus walls, to make the cavity as flat as possible, cures the remaining surface, and strives to obliterate the sinus by causing the flap of skin to become adherent to the posterior wall. He does not curette the anterior ethmoidal cells unless they are involved, but depends upon external drainage.

In these cases the resulting depression must be very marked. If the sinus is very large, it is impossible to make the skin-flap reach the entire posterior surface.

Killian makes the usual horizontal incision just above the supraorbital arch, which he continues in the middle line down on to the nasal bones. He makes an exploratory opening into the sinus, passes a probe into the ostium frontale, which he leaves in position, then, by means of a chisel, he separates the nasal bone from the median line, and turns this bone-flap outward. He then removes all the structures between the probe and the external opening. The lower part of the incision is to be closed at once and a drainage-tube inserted into the nose.

The external wound is not to be allowed to close until the walls of the wound are practically healed and not liable to occlude the lumen between the nasal fossa and frontal sinus.

Luc reports a series of cases subjected to the external operation. His early cases did not do well, on account of failure to enlarge the opening into the nose. Later he combined this large opening with external drainage, but now he thinks it wise to close the external wound, and depends upon the nasal drainage alone. He thinks the chances are better if the sinus can be obliterated, but the disfiguration consequent therefrom is a matter to be considered in every case. Luc enters the sinus through a large opening in the anterior wall.

Czerny reports a case where he attempted to turn a

bone-flap, but the consequent suppuration interfered with the success of the operation. A curved incision was made over the glabella, convex below and with the base of the flap towards the median line. There was a large opening made into the nasal fossa and the external wound closed. The case did badly on account of suppuration, the wound had to be reopened and the other sinus treated. This complication defeated the object of the operation.

Gussenbauer reports two cases of extensive malignant disease in the orbits and accessory sinuses, which he approached by a very extensive plastic bone operation which exposed these parts, including the frontal sinuses.

Consideration of External Operations.—As will be seen from the foregoing pages, there is considerable choice as to the best method to pursue, but at the outset it must be said that each case will usually present features that call for special consideration. Hence there are no definite rules to be followed.

Our problem is to relieve suppuration existing in a bony cavity (with consequent rigid walls) lined with mucous membrane, which has probably undergone permanent pathological changes. The situation is rendered more complex on account of the exposed location of the sinus, with the objection to a large or hideous scar. The presence of a fistula or a tumor gives us more reason for operating externally, and the consequent scar will be less objectionable.

On the other hand, most cases of frontal empyema have no external objective signs, hence it should be our object to leave as little deformity as possible.

Without going into detail, it would seem that the best mode of getting rid of a frontal empyema would be to obliterate the cavity of the sinus. This can be done provided the sinus is small, and, at the same time, the anterior ethmoidal cells can be curetted. The resulting scar may be very slight, but, where the sinus is large, the deformity following the removal of the anterior or the anterior and inferior walls is too great to recommend this radical procedure

in many cases. Besides, a cure cannot be warranted and the deformity will always persist.

Although there exists a very radical difference of opinion as to the advisability of making a large opening into the nasal fossa from the frontal sinus, general principles would seem to indicate that a large permanent opening was the only logical alternative. It has certainly been followed by the most favorable results.

A glance at the pathological changes consequent on chronic inflammatory processes in the frontal mucous membrane will make it evident that this membrane should be most thoroughly curetted.

(C) EXTERNAL METHODS OF OPERATION.

(1) *Obliteration of the Frontal Sinus.*—Certain operators strive for this result in every instance. If the sinus is small, it can be readily obliterated, but frequently the condition of the case will not be materially improved thereby, because a small sinus cannot be the source of an excessive exudate into the nasal fossa. Careful investigation will show that the ethmoidal cells are involved.

A few unusual cases of suppuration in the frontal sinus will be observed where there is no nasal discharge, but there is a persistent external fistula (Cases VII and IX). This condition means that the ostium frontale is occluded, and that the ethmoidal cells are probably not involved. The size of the sinus can be determined by means of the probe passed through the fistulous opening, and upon the size will depend the best method of procedure. If the sinus is small, for example, not extending laterally as far as the supraorbital notch, and measuring vertically not more than ten to fifteen millimetres on the anterior surface, it may be an easy matter to obliterate its cavity. In the great majority of cases the fistula leads through the inferior wall of the sinus (Cases IX and X) and will serve somewhat as a guide. A curved incision should be made, starting just above and external to the inner canthus, extending upward and outward along the

supraorbital arch, just below the eyebrow, nearly to the supraorbital notch. By means of a periosteum elevator the inferior wall of the sinus should be exposed and all hæmorrhage stopped in order to have a dry field of operation. Then the sinus should be entered carefully through this inferior surface (orbital portion of floor of sinus) by means of chisel, burr-drill, and bone-forceps, as may be convenient, and then this whole surface of bone removed. The interior of the sinus is to be thoroughly curetted without communicating with the nasal cavity, which is already shut off by an occluded ostium frontale. The best result will be obtained by letting such a sinus gradually close by granulation. These small sinuses offer the best chance for relief by this means.

Where the sinus is larger, the removal of the inferior surface is less effectual, so that some surgeons remove the anterior wall in addition. This has been followed by relief in a few instances where the ethmoidal cells were not involved, but the common subsequent history of these cases is the presence of a permanent or a recurring fistula. In every instance, a more or less depressed scar will follow, and this is an objection of considerable importance. Hence, the complete obliteration of a large sinus is a difficult matter, and both the success and failure of such an attempt are followed by objectionable deformity. Furthermore, the sinuses which are small enough for us to attempt to obliterate with reasonable hope of success and with only a slight scar are not the source of a large portion of the exudate appearing in the nasal cavity. Clinical and pathological evidence shows that the anterior ethmoidal cells are also involved in the majority of these obstinate cases, where treatment of the frontal sinus alone fails to relieve the condition. Operative measures, therefore, simply for the obliteration of the sinus, without involving the nasal portion of the floor of the sinus or entering the nasal cavity, are of value only in a limited number of cases. In many instances, however, where the nasal portion of the floor of the sinus and the anterior ethmoid cells

are curetted away through an opening in the orbital portion of the floor of the sinus, it is possible and probably desirable to let the soft tissues of the orbit crowd into the sinus and thus fill up and destroy the cavity. Free nasal drainage, nevertheless, is the secret of success in these cases.

(2) *Complete Removal of the Nasal Portion of the Floor of the Sinus.*—In considering the question of treatment of chronic suppuration in the frontal sinus, we must strive to understand why such suppuration is so persistent. In the first place we have to deal with a bony cavity, with consequent rigid walls, hence this space must remain as a cavity, unless subjected to the treatment just considered, which is practicable in occasional cases. The outlet of this cavity is situated at its lowest part, but is of comparatively small size. The pathological changes which accompany chronic inflammation are such as to diminish the size of the cavity by filling it with hypertrophied and polypoid tissue. These changes decrease the size of the lumen of exit. Thus the retention of pus is favored and the changes in the mucous membrane are such that the sinus cannot be properly irrigated. Furthermore, as so often mentioned in these pages, the association of the frontal sinus and anterior ethmoidal cells is such that in the majority of cases it is useless to treat the sinus without destroying the complicated labyrinth of ethmoid cells directly under the nasal portion of the floor of the sinus. These bony cells give rise to and also retain the products of exudation, and thus tend to prevent recovery. They cannot be reached and treated with safety through the nasal fossa, but must be destroyed by means of an external operation.

The essential features in the treatment of these cases consist in the removal of the whole of the nasal portion of the floor of the frontal sinus, destroying the partitions in the sinus, the complete destruction of the anterior ethmoidal cells, and careful curetting of the whole region. Thus the cavity of the sinus may become lined with smooth walls and connected with the nasal fossa by the largest possible open-

ing, and, moreover, there will be no ethmoidal cells to collect exudate or interfere later with irrigation of the frontal sinus from the nose. The mode of entering the sinus from without is a matter of cosmetic result and facility in performing the above rather than an essential in accomplishing the desired result.

Entering the Frontal Sinus through the Anterior Surface.

—The favorite route of entrance with most surgeons is through the anterior surface, but if the resulting bony defect is large, the amount of deformity is considerable, even though the wound is closed at once. A small opening in the bone may be made which will be sufficient in some cases and give good cosmetic results, but, as a rule, a careful and thorough operation cannot be done unless the cavity of the sinus is well exposed.

In order to avoid the usual depression over the sinus the following method of procedure is suggested as practised on the cadaver and carried out in Case IV. As a preliminary step the posterior nares should be tamponed, and thus there will be no annoyance whatever from blood entering the pharynx or larynx.

A curved incision, commencing over the upper portion of the nasal bone near the naso-frontal suture (Plate 81), is carried upward parallel with the folds of the skin made by the corrugator supercilii muscle for about fifteen millimetres, gradually curving outward over the glabella, and following the horizontal folds of the skin. The upper part of the incision is just above the eyebrow, and is carried boldly down to the bone without elevating the periosteum. By means of a burr-drill, or small trephine, an opening three to five millimetres in diameter is made through the anterior wall in the line of incision just above the supraorbital arch at the inner angle of the orbit. On the skull this point will be seen to be on the anterior wall of the sinus, just below the inner extremity of the superciliary ridge (Plates 1, 81). If any sinus is present in the vertical portion of the frontal bone, it will be situated at that point, otherwise the presence of

diploe will be an indication of its absence. If no sinus is detected, the inference will be that the ethmoid cells are the source of the exudate, which can be treated as described below.

Having entered the sinus by this small opening, a careful exploration should be made with the probe to determine its extent in all directions, and, if possible, to decide as to the changes in the mucous membrane. If the sinus is very small, the opening may be enlarged a little, the mucous membrane curetted, and the nasal portion of the floor of the sinus removed in the manner to be considered. Where the sinus extends to the supraorbital notch or beyond, as is usually the case, more room must be had for inspection and operation. For this purpose the original incision is continued horizontally in the folds of the skin and then carried downward to the supraorbital notch (Plate 81), so that the extremities of the incision are more or less concealed by the corrugator folds and the eyebrow. Meanwhile, the periosteum must not be disturbed.

Starting from the small exploratory opening in the bone, a bone-flap is to be chiselled corresponding to the line of incision, with the supraorbital arch serving as a base (Plate 82). Towards the median line the bone is to be chiselled as far as the naso-frontal suture, and then directly downward and backward towards the orbital plate of the frontal bone. The external extremity passes down across the arch to meet this same plate. Now it will be very easy to pry the bone-flap forward so that it will fracture along the thin orbital surface or floor of the sinus close to the arch. If done carefully, the entire piece of bone will be adherent to the periosteum. An extensive view of the sinus is obtained at once, whereby its whole cavity can be inspected and treated. After completion of the operation on the floor of the sinus, the bone-flap is to be replaced and the wound closed with interrupted or buried sutures. So much in regard to entering the sinus through the anterior wall. The great advantages of this route are that the whole sinus may be open to perfect

inspection, and a large opening made into the nasal fossa without disturbing the orbital fossa or its contents.

Entering the Frontal Sinus through the Inferior Surface.

—There are many cases where this route is infinitely preferable. It does not allow such good exposure of the sinus, but usually sufficient for all cases; it renders the ethmoidal region very accessible; the operation is followed by little or no deformity (Case V); it is more liable to give rise to inflammable disturbance in the orbital fossa, or interfere with the lachrymal apparatus, if not carefully done. This route is preferable in cases complicated by fistula or orbital tumor.

The preferable incision is that figured in Plate 81, No. 2. It commences opposite the inner canthus, in front of the margin of the orbit, over the nasal process of the superior maxilla. It is carried upward, gently curving outward to meet the eyebrow, and is then carried along the centre of the eyebrow as far as the supraorbital notch. Previous to making this incision, which is carried directly to the bone, the lower half of this inner portion of the eyebrow should be shaved, for the incision should be healed in a week, and thus there will still be a portion of the eyebrow along its whole length, so that the immediate appearance of the patient is not much altered. In time, only a small portion of the incision (about one centimetre) will remain uncovered by hair.

Hæmorrhage may be expected from the supraorbital and angular arteries, which can be troublesome. The periosteum is to be elevated and the flap turned down so as to expose the vicinity of the internal angular process of the frontal bone (Plates 1, 5, 9). The field of operation should be made perfectly dry, and no further hæmorrhage need be expected from the external wound. The pulley of the external oblique muscle is liable to be reflected with the periosteum, but this does not seem to affect the position or motion of the eyeball.

By means of a chisel a small opening is to be made through the orbital portion of the floor of the sinus, just above the internal angular process of the frontal bone, in

the line of the margin of the orbit, which separates the anterior from the inferior surface of the sinus. The bone here is thinner than on the anterior surface and quite easily perforated. The opening into the sinus should be large enough to admit the examining probe, which is made to perforate the lining mucous membrane. If there is an empyema of the sinus, pus will be seen coming out of the exploratory opening, otherwise the natural inference is that the sinus is not much affected and that the pus originates in the anterior ethmoid cells, provided the antrum, as a primary source, has been eliminated. If only the ethmoid cells are involved, we are in a very favorable position to treat them.

The examining probe, now in the sinus, is passed in all directions in order to ascertain its shape and size, so that we may know where it will be safe to work. The exploratory opening should now be enlarged so as to be somewhat oval in shape, with the long diameter vertical, and measuring not over fifteen millimetres. This opening corresponds to a portion of the inner wall of the orbital fossa, including, for the most part, the orbital portion of the floor of the sinus at the internal angular process of the frontal bone, a part of the upper end of the lachrymal bone, and extending in front as far forward as the posterior border of the nasal process of the superior maxilla, and posteriorly as far as the os planum of the ethmoid. The situation of this opening is such that no deformity will result, as it is on a plane at right angles to and posterior to the broad fibrous diaphragm, containing the tarsal cartilages, which stretches across the margin of the orbit. The lachrymal apparatus will not be injured, for the upper portion of the lachrymal sac will be reflected from the bone with the soft parts. This bony opening will generally be sufficient to enable the operator to be certain that the sinus has been cleared of all septa and hypertrophies.

So much for the preliminary portion of the operation, which consists in entering the sinus either through the anterior or inferior walls, and we are now ready to perform the

most important step in the operation. This consists in the removal of the entire nasal portion of the floor and thorough curetting the anterior ethmoid cells, and thus establishing as large a communication with the nasal fossa as possible.

If the sinus has been entered through the anterior wall, it should be our aim during the operation to avoid entering the orbit through the vicinity of the lachrymal bone or os planum. A small probe should be passed through the ostium frontale into the nose and left in position as a guide. A study of the anatomical relations will show that it is not safe to force instruments directly backward on account of the danger of entering the cranial cavity (Plates 9, 40, 51, 53). The general curvature of the posterior surface is fairly constant and regular (Plate 51), so that any sudden interruption in this curvature is suggestive of the presence of a frontal bulla or ethmoidal cells crowding into the posterior angle of the sinus. It will be safe to break through these cells with the instrument directed downward, inward, or somewhat backward. The contour of the orbital wall of the sinus is very regular as it passes down to become the internal wall of the orbital fossa (Plates 20, 57, 65), and this regularity is a sufficient guide against entering the orbital fossa. It is our aim to remove as much of the nasal portion of the floor of the sinus as possible in order to establish the best drainage. The lateral anatomical limits are the nasal septum internally, and the downward prolongation of the orbital portion of the floor of the sinus externally (Plates 13, 20). Anteriorly we are limited by the thick bony ring around the hiatus frontale, where the frontal bone articulates with the nasal bone and nasal process of the superior maxilla (Plates 13, 15, 63). Posteriorly there is no immediate hinderance after we reach the posterior angle of the sinus, for here we come upon the anterior ethmoid cells, and continue backward under the plane of the cribriform plate to the posterior ethmoid cells (Plates 13, 16, 17, 51, 77, 88). Hence, from the vicinity of the ostium frontale, in which the probe has

been placed as a guide, it will be safe to perforate the floor of the sinus directing instruments downward, backward, or inward. The best instruments are small curettes of different sizes, both curved and straight, and also small chisels. It was discovered on the cadaver that the fifth finger could be introduced into the anterior nares almost without exception beyond the second joint (which measures five centimetres in circumference), so that the tip of the finger reached the body of the sphenoid bone. Thus the nasal cavity could be explored and the movement of the curette directed to immense advantage. This procedure was carried out in Case V with perfect ease. The finger should be lubricated with sterilized oil or vaseline.

In the early attempts to overcome the frontal or ethmoidal suppuration the anterior extremity of the middle turbinate has probably been removed (Plate 30), but if it remains, it will be broken away by the curettes. All the anterior ethmoidal cells should be curetted away as thoroughly as possible, and it will do no harm if some of the posterior cells are injured. The finger itself may break up some bony partitions as well as serving as a guide for the curette passed in through the external opening. Practically this operation consists in removing the greater part of the lateral mass of the ethmoid, which fills in the hiatus frontale, with a comparatively small external opening and the fifth finger in the anterior nares. Meanwhile no blood has reached the pharynx on account of the tampon. All septa in the frontal sinus should be broken down, and as a final act the lining mucous membrane should be thoroughly curetted. The opening into the nose is such that no drainage-tube will be required, and the external wound should be closed without drainage and protected with a sterile dressing. The nose should be packed with iodoform gauze for twenty-four hours.

Where the sinus has been entered from the inferior wall it is somewhat easier to reach the ethmoid cells, but in general the same directions are to be followed, as when operating

through the anterior wall. The sinus is not so well exposed, but all septa can be destroyed and the nasal portion of its floor removed, so as to establish perfect drainage. The posterior ethmoid cells, also, are very accessible by this route. No nasal drainage-tube will be needed, and the external wound is to be closed absolutely.

In every instance we must consider whether the antrum is free or has become involved in the suppurative process primarily, or is acting as a reservoir for pus coming from above. In the early examinations it is well to determine as accurately as possible the condition of the antrum, but conclusions can be verified just before the operation by the introduction of a needle into the cavity through the inferior meatus. If the anterior ethmoid cells are involved, it is common to find pus in the antrum. If pus is found in the antrum, it is well to be certain that there will be a sufficient aperture for drainage. Operations on the cadaver show that it is very easy for the curette to enter the antrum when destroying the upper part of the uncinate process, so that, intentionally, where we find pus in the antrum, it is well to make a large opening through the middle meatus. The antrum may call for special treatment (Lothrop, "Empyema of the Antrum of Highmore," *Boston Medical and Surgical Journal*, May, 1897), which does not concern us at this time.

After-Treatment.—The treatment of the external wound offers nothing peculiar. There will be more or less œdema of both eyelids, which will subside in a few days.

The gauze in the nasal fossa is to be removed in about twenty-four hours. On account of the large opening into the sinus, drainage will be perfectly free. The lower portion of the nasal fossa can be irrigated two or three times a day, but it is well not to force fluids up into the sinus for a few days, until the external wound has become united. A warm 2-per-cent. boric acid solution is the most satisfactory. An efficient apparatus for irrigation consists of a slender S-shaped canula, bent so as to pass from the anterior nares, attached to a rubber tube, which in turn is fastened to a

barrel syringe with a capacity of at least 100 cubic centimetres. The patient can readily be taught to use this apparatus. At the time of operation all fragments are to be removed from the nasal fossa as well as possible, but some will remain, which can be trimmed later by means of the snare and forceps.

For the reason that we are dealing with a region already infected at the time of operation, it is not surprising if the external wound should fail to unite at once throughout its whole extent, and a fistula result. If, however, free nasal drainage has been established, such a fistula will not persist for a long time.

REPORT OF CASES.

The following cases have been selected to serve as types of acute and chronic inflammatory processes involving the frontal sinus, complicated or not by extension in various directions. They are presented only in moderate detail.

CASE I.—*Acute Inflammation in the Frontal Sinus followed by Resolution.*—J. T. E. had just passed through an attack of acute coryza of average severity. Seven days later he began to have pain in the right frontal area, which increased in severity so as to be unendurable. It was relieved by no sort of internal medication. The frontal area was very tender on palpation, and there were no intranasal symptoms referable to the frontal sinus.

A tampon of cotton, saturated with a 4-per-cent. solution of cocaine, was applied as high as possible under the middle turbinate bone, and removed after a few minutes.

During the day the patient sprayed the nose with an oily solution of menthol. The pain continued for thirty-six hours, and then rapidly decreased, followed by a considerable discharge from the right nostril. This continued for a few days only. One week after there was no further trouble, nor has there been any recurrence.

This case is an example of the extension of an acute inflammatory process from the nasal cavity to the frontal sinus, with practically a spontaneous resolution. Such cases are of common occurrence.

CASE II.—*Acute Inflammation in the Frontal Sinus of Marked Severity becoming Chronic.*—Miss A., seventy-five years of age, while under treatment for a surgical affection, suffered from an attack of influenza. Following immediately after the onset of acute nasal inflammation, symptoms of acute inflammation referable to the left frontal sinus, arose.

These symptoms were very severe and lasted two weeks. Meanwhile there was much seropurulent discharge from the left nostril, and oftentimes containing more or less blood. At the end of three weeks all the subjective symptoms had disappeared, but the nasal discharge continued. Eight months later the same objective symptoms persist; there is some tenderness over the frontal sinus, but she has no pain. Her age and physical condition contraindicate operative interference.

CASE III (Plate 83).—*Mucocele of Left Frontal Sinus, becoming a Chronic Empyema of the Frontal Sinus and Anterior Ethmoid Cells: Secondary Involvement of the Antrum.*—I am indebted to Dr. J. W. Farlow, of Boston, for the privilege of publishing this case, under whose treatment the patient has been for the last year.

R. M., twenty-five years of age, baker, has had a swelling in the upper inner angle of the left orbital fossa for the last ten years. He states that it first appeared while suffering from scarlet fever. It has increased slowly without ever causing acute symptoms, although it is occasionally a little tender. It was incised once with a negative result. He is not subject to coryza, and has never had any nasal discharge. At times the tumor is a little smaller than usual, and then he has observed that its surface is rough and irregular.

The tumor has always obstructed the tear-duct, so that tears escape over the cheeks. The eye soon became dislocated, and continues to remain so, but vision has not been affected in any way.

Nearly a year ago the patient first appeared for treatment, on account of a sudden increase in the size of the tumor, accompanied by pain and tenderness and œdema of the eyelids. The size of the tumor at this time is shown in Plate 83.

Examination reveals a tumor about the size of a robin's egg, continuous on the periphery with the frontal bone above, the lachrymal bone in front, but posteriorly its outline is lost in

the orbital fossa. Its surface is soft and fluctuating in places, alternating with thin bony areas, which extend from a protruding bony periphery. "Egg-shell crackle" could be detected here and there.

Intranasal examination shows that the mucocele has pushed the middle turbinate against the septum of the nose. The eyeball is dislocated downward, forward, and outward, so that it is in close proximity to the malar bone, but neither subjective nor objective symptoms have resulted therefrom. There are no particular constitutional symptoms.

After removing a portion of the middle turbinate bone under cocaine anæsthesia, a polypoid mass appeared, which was found to consist of a thin sac containing about an ounce of thick viscid fluid, which escaped from the anterior nares. This circumstance was followed by a diminution in the size of the external tumor, and relief from pressure symptoms.

From time to time various intranasal operations have been performed in order to establish free drainage from the frontal sinus and ethmoid cells. After the removal of the original contents of the mucocele the discharge became purulent, as is characteristic in these cases, and has remained so ever since. The external tumor has decreased very much, and is marked by an irregular bony outline. The eyeball still remains close to the malar bone, and external palpation would suggest that the ethmoid cells are involved in the suppurative process.

On account of undue prominence of the anterior wall of the superior maxilla the antrum was aspirated through the inferior meatus, and found to contain pus. A tooth was extracted and the antrum irrigated through the alveolus. There would seem to be a general association of the left accessory sinuses.

The external appearance of the patient has been greatly improved, and the amount of discharge from the nose has decreased very much. The patient is still under Dr. Farlow's treatment. This case has just been reported in detail before the American Laryngological Association.

CASE IV.—*Suppuration in all the Accessory Sinuses of the Left Nasal Fossa, with Caries of the Frontal and Superior Maxillary Bones.*—A. G., twenty-eight years old, has suffered for the last eleven years from extensive caries in different facial bones of syphilitic origin. She has undergone several operations at the

hands of different surgeons with little or no improvement. Extreme antisiphilitic treatment has been of no avail.

When first seen there was marked deformity as the result of inflammatory oedema (Plate 84), and this swelling never decreased. There was profuse discharge of pus into the middle meatus. At times the whole left side of the face was painful, with tenderness localized particularly over the facial wall of the antrum and the inferior surface of the frontal sinus. She had abscesses in the vicinity of both lachrymal sacs, which were incised, and on the left side the tears no longer passed normally into the nose, but escaped over the cheek, and had given rise to a very troublesome chronic eczema.

All the teeth of the upper jaw had been removed, and she had undergone the canine and alveolar operations, but still the antrum was full of pus, as demonstrated by the exploratory needle. On account of the failure of these methods to overcome the antrum suppuration, and the great chronicity of the case, the naso-antral septum under the inferior turbinate bone was removed, as previously referred to (*Boston Medical and Surgical Journal*, May, 1897). Patient recovered well from the operation, and at the end of about four weeks the antrum irrigations were free from pus. Nevertheless, the facial deformity remained unchanged, also the frontal tenderness, and there was a certain amount of pus referable to the frontal sinus, the anterior ethmoid cells, or both.

The frontal sinus was opened through the anterior wall and a bone-flap turned down, as has been previously described in detail. The nasal portion of the floor of the sinus was carefully removed and the anterior ethmoid cells curetted. On account of the post-nasal tampon there was no annoyance from hæmorrhage. A rubber drainage-tube was inserted leading from the sinus to the anterior nares, and held in position by two fine wire sutures, which also served to retain the replaced bone-flap. Such drainage is no longer considered necessary, for later experience has demonstrated that the enlarged opening into the sinus is ample. On account of the extensive persistent swelling over the malar and superior maxillary regions, an exploratory incision was made below the malar bone, in order to discover necrosed bone, but none was found.

The frontal wound was closed without external drainage and

united permanently, except where the wire suture, connected with the drainage-tube, appeared. This fistula healed at the end of about four weeks, and the wound remained permanently closed. There was no depression of the anterior wall of the sinus.

The nasal discharge became gradually less, but the general swelling of the face, present before the operation, remained constant.

Two months after the operation the patient had a rise of temperature with severe headache and other symptoms, which were evidently due to an acute meningitis. This complication proved fatal.

An incomplete post-mortem examination was allowed, when it was ascertained that there was a perforation in the posterior wall of the frontal sinus near the external angle. The perforation itself would just admit a small probe, but it was surrounded by an area of carious bone. There was found an acute meningitis, most marked in the left frontal region, and there were several small pus-collections in the cortex of the frontal lobe.

There was a small amount of muco-pus in the frontal sinus, but its walls were smooth, and the enlarged opening into the cavity admitted the little finger. There was firm union in the vicinity of the bone-flap. Death was obviously the result of a meningitis, due to a perforation in the posterior wall of the sinus, which in turn was consequent on a carious process in the bone. In view of the past history this was a syphilitic process. Cultures revealed a mixed infection with a predominance of streptococci. On account of the lapse of time since the operation (two months), and the location of the carious bone, it is fair to assume that the perforation was not of traumatic origin. It was clearly demonstrated that such a plastic bone operation was practicable.

CASE V.—*Combined Empyema of the Frontal Sinus and Ethmoid Cells, with Pus draining into the Antrum: Complete Recovery following the Operation.*—N. R., twenty-six years of age, has been troubled with a suppurative process in the accessory sinuses of the left nasal cavity for the last ten years. The nasal discharge has been profuse most of that time, meanwhile she has suffered from constant headache in the frontal region, which was frequently severe enough to cause her to remain in bed. She states that she was never free from suffering. The pain was referable

to the whole left side of the face, particularly in the left frontal area.

Eighteen months ago there appeared a swelling at the upper inner angle of the left orbital fossa accompanied by pain and tenderness, together with swelling of the eyelids and soft parts in the vicinity. These external signs disappeared spontaneously at the end of three weeks, but the pain and discharge remained as before.

About sixteen months ago she was referred, by Dr. J. A. Gordon, of Quincy, to Dr. F. C. Cobb, of Boston. Nasal examination showed the presence of polypi in the left cavity, in addition to a profuse discharge of pus. These polypi were removed by Dr. Cobb, and some time later the anterior extremity of the middle turbinate. For a time there was a decrease in the amount of pain and discharge, but eventually the general condition remained about the same. It was also discovered that the left antrum contained pus, as demonstrated by transillumination and confirmed by the aspirating needle.

Two months ago the patient was kindly referred to me for radical treatment by Dr. Cobb. The frontal and orbital pain had become more severe of late and the discharge was profuse, but without particular odor. There was marked tenderness at the inferior wall of the frontal sinus, but no swelling. Nasal examination showed nothing beyond the presence of pus escaping above the inferior turbinate, and the absence of the anterior end of the middle turbinate. After ten years of suffering the patient was very willing and anxious to have anything done for her relief, and consented to an external operation.

Operation (ether).—As a preliminary step the antrum was aspirated through the inferior meatus and found to contain pus. The posterior nares were plugged with a gauze tampon. The lower half of the inner portion of the eyebrow was shaved, and the vicinity prepared for operation. The incision already described for exposing the floor of the sinus (Plate 81, No. 2) was made down to the bone, and the flap reflected so as to include the periosteum. Hence, two-thirds of the incision was in the eyebrow, while the inner extremity arched downward towards the inner canthus. The exposed bone included the floor of the sinus near the internal angular process of the frontal bone, the upper portion of the os planum and nasal process of the superior

maxilla. Hæmorrhage from the supraorbital and angular arteries was controlled by gauze pressure. After the wound was dry a small opening was chiselled into the floor of the sinus, and on passing through the lining mucous membrane considerable pus escaped. The probe showed the sinus to be of average size. This opening was then enlarged to about ten millimetres in diameter. According to the method described in detail in the previous pages, the nasal portion of the floor of the sinus and the ethmoid cells were carefully curetted. The little finger, introduced through the anterior nares, was of immense value in guiding the curette passed through the external wound, and also served to destroy some of the ethmoid cells. The operation was practically a curettement of the anterior portion of the lateral mass of the ethmoid. An opening into the antrum was made through the middle meatus.

No drainage-tube was used between the sinus and the nasal cavity, the sinus walls were carefully curetted, and the external wound closed without drainage. The nasal cavity was packed with iodoform gauze through the anterior nares. Absolutely no blood reached the pharynx on account of the postnasal tampon.

On the following day the gauze was removed and no further packing used. With the exception of the extreme inner end of the incision, primary union resulted throughout and remained firm. On account of the free nasal drainage the sinus was not irrigated during the first week, but the nasal cavity was cleansed three times during the day with a 2-per-cent. boric acid solution. At the end of two weeks the fistula had healed and remained so for three weeks, when it reopened for a period of three weeks, and has remained closed ever since.

The pain and headache disappeared at once after the operation and have not returned. Two months after the operation there was not enough discharge for the patient to perceive it. The anæsthesia produced by cutting the supraorbital nerve is gradually disappearing.

Since the first week after the operation the sinus has been irrigated three times daily with a 2-per-cent. boric acid solution. This was performed readily by the patient using a bent canula and barrel syringe. By means of the snare a few polypoid granulations were removed from the ethmoid region. The antrum remains free from pus. The patient has gained considerable

weight, is perfectly free from pain, has a cicatrix that is hardly perceptible, and states that she feels perfectly well.

CASE VI.—*Repeated Pus Accumulations in Left Frontal Sinus; Spontaneous Evacuations into Nasal Cavity; Present Absence of Symptoms.*—I am indebted to the kindness of Dr. L. S. Pilcher, of Brooklyn, for the privilege of publishing the following three cases. His records of the cases are as follows:

“T. A. T., male; forty-one years of age; of somewhat delicate constitution. Ten years ago suffered in quick succession from pneumonia, hæmoptysis, and acute articular rheumatism, as a result of which he was an invalid for three years. Prior to this he had suffered for a period of about five years from a chronic nasal catarrh following a severe attack of acute coryza. This acute attack was attended with special distress between the eyes, and with severe general headache. During the time he was the subject of the pulmonary and rheumatic troubles, and for some years after his recovery from these, he was free from nasal symptoms. However, in 1885, he began to suffer much from frontal and supraorbital headache, affecting the left side especially. Two or three times each winter these would be complicated with severe attacks of acute coryza, attended with a sense of great discomfort and distention between the eyes; the left conjunctiva would become congested, while the right would remain unaffected; there would be severe pain in the left orbit, diffusing itself thence over the forehead and backward to the left side of the head.

“Some of these attacks gradually subsided without any noticeable crisis; at other times, immediate relief to all the symptoms would suddenly occur after a free flow of pus from the left nasal cavity. Again, sudden abundant escape of pus would at times occur, not preceded by acute pain, but only by a variable period of dull distress in the forehead. After these gushes of pus would take place a continuous purulent discharge, amounting to from one to two and one-half ounces daily, would persist for a time, gradually diminishing in quantity, until it ceased altogether. During the winter of 1889 he had an unusually severe and prolonged attack, extending over some months.

“The patient has had no particular treatment for his condition, and his recoveries have been spontaneous. There have been no recent reports from this case.”

CASE VII.—*Abscess of Left Frontal Sinus with Necrosis of Anterior Wall and Floor of Sinus: Sequestrotomy; Obliteration of Sinus with Cure.*—Dr. Pilcher's record: "Ellen T., aged nineteen years, appeared with a suppurating sinus of the upper and inner part of the left orbit, of which she gave the following history: Ten years previously she had been struck by a stone upon the left frontal eminence, inflicting a wound which healed in three weeks, but from that time she began to suffer from daily headaches. Two years ago a swelling over the left eye appeared, which, however, disappeared again in a few days under local applications. At the end of eighteen months the parts again became swollen and painful. Repeated incisions into the swelling, with liberation of pus, were made during the months following, resulting finally in the persistent sinus noted above.

"She was referred to me by Dr. Arthur Mathewson, and an exploratory operation under chloroform was performed. After making incisions through the soft parts sufficiently free to expose the margin of the orbit and the surface of the frontal bone, at the inner angle of the orbit, two bony sequestra were exposed, lying loosely in the tissues. These sequestra were removed.

"Examination of these shows that together they compose the anterior and inferior walls of the frontal sinus. The exposed shallow cavity of the sinus was shut off from the nasal cavity and its mucous membrane hypertrophied. This was curetted and the skin replaced so as to obliterate the sinus. Rapid repair took place with very little deformity."

CASE VIII.—*Chronic Frontal Empyema with Orbital Tumor and Fistula; Operation for Obliteration of Sinus followed by Recovery.*—Dr. Pilcher's records: "S. B. S., sixty years of age, an oysterman, had a well-marked tumor at the inner angle of the left orbit, extending upward and inward to the midfrontal region (Plate 89). At the most prominent part of the tumor was a fistulous opening leading upward into a large cavity.

"For ten years or more he had had some nasal catarrh with occasional discharge of offensive pus and crusts from his nose without subjective symptoms. Four years ago he first noticed a swelling at the inner angle of the orbit, which, without tenderness or redness or subjective symptoms, slowly increased to the size of a small hen's egg, pushing the eye outward so as to cause diplopia. Within a year the tumor began to discharge into the

nostril. At the Brooklyn Ear and Eye Hospital repeated incisions into the tumor caused the evacuation of pus, but not the collapse of its walls, hence the case was referred to me, when the following operation was performed:

"Free incision of the fistulous track having been done, an opening of some size through the anterior wall exposed the frontal sinus, which was greatly dilated. No communication was found with the nasal cavity. The posterior wall of the sinus had been absorbed over an area about one centimetre in diameter, bringing the sac of the abscess into immediate juxtaposition to the dura mater at that point. Hence it was determined to obliterate the sinus on account of the risk of further trouble following attempts to preserve it and restore nasal communication.

"The whole anterior wall of the sinus was removed, the mucous membrane thoroughly curetted away, and the skin-flaps replaced and retained by compress. Primary adhesion of much of these flaps was secured, the remainder became healed by granulation with limited suppuration. A fistula persisted for some time, which finally became healed."

CASE IX.—*Abscess of Frontal Sinus; Occlusion of Ostium Frontale; Necrosis with Persistent Fistula.*—This case occurred in the practice of Dr. J. C. Munro, of Boston, and he has kindly allowed me to publish these notes:

Jos. C., Italian, sixty years of age. About one year ago there appeared a swelling in the upper inner angle of the right orbit, which was red, tender, and painful. This ruptured spontaneously, discharged pus, and a fistula resulted, persisting after an attempt to overcome it by operation.

When first seen by Dr. Munro there was a small discharging sinus at the inner angle of the orbit; there was œdema of the upper eyelid, with apparently some dislocation of the eyeball. The probe reveals the presence of necrosed bone. Antisyphilitic treatment has been of no avail. There was no nasal discharge.

Operation (ether narcosis).—Vertical incision at inner angle of orbit extending to frontal bone. Fragments of necrosed bone were removed from the vicinity of the ethmoid region, and a small perforation was discovered leading through the inferior wall of the frontal sinus. All of these openings were enlarged, the necrosed fragments removed, and the wound packed with gauze. The opening was made into the nasal fossa. The usual

amount of oedema followed the operation, together with some conjunctivitis, both of which subsided in due time. Two months later there still remained a granulating area. Patient was lost sight of for a month, when he returned with a loose fragment of bone appearing at the old wound. Under ether a sequestrum of bone, tapering at one end, one and one-half inches long, and half an inch wide, was removed. This fragment of bone seemed to be in the nature of a sequestrum originating in the frontal sinus, and the remaining cavity of the sinus was apparently walled off in all other directions. The wound closed rapidly so that a very small fistula remained. Meanwhile there have been no nasal symptoms.

From time to time this fistula has closed, but has never remained permanently healed. This case shows that under careful treatment it has been impossible to obliterate the frontal sinus, either on account of its size or the presence of an obscure piece of necrosed bone. The absence of nasal discharge is proof of the occlusion of the ostium frontale, hence, if there is any cause for the persistence of the exudate, the fistula will fail to heal. Under the circumstances it would seem that the only alternative would be to establish nasal drainage in the manner already described.

CASE X.—*Frontal Empyema following Trauma; Uncomplicated Recovery.*—The following case occurred in the practice of Dr. F. B. Lund, of Boston, and to him I am indebted for the following notes:

"A boy of twelve years was operated for a compound depressed fracture of the frontal bone in the vicinity of the frontal sinus. All wounds healed, and he made an apparently good recovery. Two months later he returned for treatment on account of two sinuses which had appeared at either end of the naso-frontal suture. There was considerable swelling of the subcutaneous tissue and a moderate amount of seropurulent discharge from the sinuses. A probe passed into the left opening in such a way that the end was evidently in the frontal sinus, the resistant bony walls of which could be detected, but there was no evidence of necrosed bone. The right sinus connected with the left one under the skin. There was some left nasal discharge.

"*Operation* (ether narcosis).—The left eyebrow being shaved, an incision was made at its inner end running horizontally outward, down to the bone, and, on elevating the skin, it was found

that the anterior wall of the left frontal sinus had been fractured into three pieces and driven inward; these fragments of bone were in a healthy condition.

"The anterior wall of the sinus was removed, showing the absence of hypertrophied or polypoid mucous membrane. A probe was passed through the ostium frontale into the nasal cavity, and the natural opening enlarged by means of a fine curette. A drain of half a dozen strands of silkworm gut passed down to the nares, but this was pulled out by the patient on coming out of ether. The sinuses in the skin were curetted, and the incision over the frontal sinus closed without drainage. The wound healed by first intention and the sinuses closed in a few days. The after-treatment for the nasal cavity consisted in three or four daily irrigations with a normal salt solution. A perfect recovery resulted."

This case evidently was not complicated by suppuration in the anterior ethmoid cells. Restoration of nasal drainage was sufficient for recovery, without attempting to obliterate the sinus.

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CONTRIBUTION TO THE SURGERY OF THE KIDNEY.

A REPORT OF CASES TREATED IN THE ROOSEVELT HOSPITAL
OF NEW YORK IN THE PERIOD FROM JANUARY 1,
1890, TO OCTOBER 1, 1898.

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(Continued from page 39.)

PYONEPHROSIS.

THE cases of pyonephrosis were nine, five of whom were males and four females. Their average age was males, thirty-five years; females, twenty-nine. Oldest male, forty-nine; youngest, twenty-six. Oldest female, forty-one; youngest, twenty-four.

Etiology.—In two cases (I and IX) a stone was found in the pelvis of the kidney blocking the ureter. One case (VI) was due to catheter infection of bladder after labor, producing an ascending ureteritis and suppurative nephritis. One case (II) resulted from suppurative ureteritis of unknown origin.

Cases III, IV, V, VII, and VIII resulted from suppurative nephritis of unknown origin. The signs and symptoms in these cases did not differ, except in a few instances, materially from those spoken of in the cases of suppurative nephritis. In all there was a history of renal pain and pyuria, extending over periods varying from sixteen days to twelve years. In all continued fever and prostration existed on admission to the hospital, as well as a painful, tender swelling

in the region of the kidney. In one case this was of great size.

Cases II to VII were treated by incision and drainage, nephrectomy being deemed at the time impracticable.

Case I was treated by incision and subsequent nephrectomy. Cases VIII and IX were treated by nephrectomy.

Case II was a typical pyonephrosis of enormous size, with the history of the existence of a tumor in the kidney region for ten years. The very large cyst-like cavity was tapped several times. The largest amount of mixed urine and pus withdrawn at any one aspiration was 238 ounces. Later the sac was drained through a tube in the loin, and, although the cavity still continued to discharge, he was much improved in health when he left the hospital, six months after the first aspiration. He cannot be found at the present writing.

Case III had suffered from renal pain and pyuria for four years. Her kidney was drained in the loin and a large amount of pus evacuated. She left the hospital improved in general health with a small sinus in the loin. Not found at present writing.

Case IV underwent three operations by incision and drainage for repeated reaccumulations of pus in the kidney. After the third operation he died septic.

Case V possesses some features of interest, which are included in the appended history.

Case VI was an example of catheter infection extending upward to the kidney. When brought to the hospital she was decidedly septic, and a large kidney tumor existed in the left loin. This was incised in the loin and a large amount of pus escaped. When last heard from, eighteen months after operation, her general health was good; her urine normal. A small clean sinus existed in the loin.

In Case VII there had been a long history of renal pain, intermittent pyuria, attacks of partial suppression and uræmia. When brought to the hospital the patient was dull in intellect, emaciated, with a subnormal temperature,

and a large tumor in the left loin, extending downward into the iliac fossa. His urine was alkaline, of diminished specific gravity, and contained much pus. The kidney was incised in the loin, and a large amount of stinking pus was evacuated from the kidney, dilated pelvis, and greatly dilated ureter. The patient died uræmic on the eighteenth day.

In Case I there had been a history of gradually failing health and the development of a kidney tumor. The kidney was drained through the loin, but the pus reaccumulated. A second operation was done for drainage, but the patient did badly and developed a septic fever. Fifteen days later the kidney was removed by a very difficult intra-abdominal operation. He died of shock thirty-six hours later. The ureter was found blocked by a calculus. The pelvis of the kidney was dilated. Two other calculi were found in the cavity of the kidney.

In Case VIII the history of symptoms referable to the kidney was short. The patient dated his symptoms from a muscular strain sixteen days before admission. He was taken suddenly ill with pain in the hypochondrium, right side. Chill and fever, prostration, and pyuria. Two weeks after admission a considerable tumor had developed in the right loin. The kidney was removed through an oblique lumbar cut five inches long. The kidney had been destroyed by suppuration, and was converted into a mere pus-sac. Aseptic healing down to a sinus, which still remained when he left the hospital, eight months later. Could not be found at present writing.

The mortality of the cases of pyonephrosis was 44 per cent.; the mortality of the cases in which nephrectomy was done was $33\frac{1}{3}$ per cent.

CASE I.—(*Pyonephrosis; Nephrectomy.*)—Henry S., aged thirty-nine years, male, was admitted January 21, 1890.

Previous History.—There had been gradually increasing ill health but no definite kidney symptoms, except the presence of a tumor. The illness began eighteen months ago. In November,

1889, the patient was operated on in this hospital for pyonephrosis by incision and drainage.

Present Illness.—Upon admission examination showed the presence of a sinus in the loin discharging pus. There was a large tumor occupying the region of the kidney.

Operation, January 22, by Dr. McBurney. Multiple abscesses in the kidney evacuated. The patient ran a continuous temperature and lost strength. On February 7 the kidney was removed through a large incision. The operation was very difficult. There were adhesions to the vena cava, the peritoneum, and diaphragm. The peritoneal cavity was widely opened. The patient died after thirty-six hours of shock.

Pathological Report.—The tumor consisted of the kidney, was as large as a child's head. It consisted of a series of abscesses enclosed in fibrous walls. The ureter was blocked by a calculus impacted in the renal pelvis. Below the situation of the stone the ureter was patent. Two other small calculi were found in the abscess-cavities.

CASE II.—(*Hydronephrosis; Pyonephrosis; Nephrotomy.*)—James F., aged twenty-eight years, single, was admitted February 16, 1891.

Previous History.—Twelve years ago patient began to have attacks of pain in the left side of the abdomen. Ten years ago he first noticed a slowly progressive enlargement of that side of the belly, which has continued to increase up to the present time. He is a poorly nourished individual, anæmic, with a rapid pulse. Temperature, 100° F. He complains of weakness and discomfort on account of the size of the abdomen.

Physical Examination.—The abdomen was greatly enlarged. A large, tense, smooth tumor occupied the entire left side of the belly and extended eight inches beyond the median line towards the right. The tumor was flat on percussion. Inflation of the intestine with gas demonstrated a movable coil of intestine, overlying the tumor, and passing from the right hypochondrium to the left inguinal region. The aspirating needle withdrew a light brownish fluid, resembling in color the urine passed *per urethram*. Upon boiling, the fluid coagulated, and when burned gave off a urinous odor. The fluid contained pus, uric acid, and urea. There was slight frequency, but urination painless. Urine cloudy,

brown, acid; specific gravity, 1025; much albumen, and contained much pus, red blood-cells, and renal epithelium.

Operation, February 8, 1891, by Dr. McBurney. Aspiration three and one-half inches to the left of the spine and below the last rib. Five pints of thick brown pus evacuated. No constitutional effects. On March 9 138 ounces of the same fluid were withdrawn, and on March 16 238 ounces, and the sac emptied. On April 9 the abdomen was increased in size. He was etherized and a small exploratory incision made parallel to the last rib. The cyst was opened and a small portion of its sac excised. This tissue resembled fibro-cartilage. A large amount of brown pus was evacuated and a large rubber drain inserted. The wound continued to discharge freely, but the patient improved in health. The sac decreased in size, and he left the hospital on June 19, 1891. Urine was then normal in quality and quantity. He returned for dressing for a time, and was then lost sight of.

CASE III.—(*Pyonephrosis; Nephrotomy.*)—Mary E. M., aged forty-one years, single, was admitted June 8, 1892.

Previous History.—For the past four years has suffered from pain in the left lumbar region. Severe attacks occasionally.

Physical Examination.—Patient anæmic, emaciated, and weak. An indefinite tumor could be felt on the left side of the abdomen. Temperature, 102° F.; pulse 110. Urine contained much pus.

Operation, by Dr. McBurney, June 8. Oblique lumbar incision. One and a half pints of pus were evacuated from abscess within kidney. Rubber drain and packing.

Wound Healing.—The patient left the hospital with a small sinus. At this time her urine contained a moderate amount of pus; pain less; general health better.

Subsequent History.—Not found.

CASE IV.—(*Pyonephrosis; Nephrotomy.*)—George A. B., aged forty-nine years, was admitted November 7, 1892.

Previous History.—Was operated on here three years ago for pyonephrosis by incision and drainage, since when a pus sinus has remained.

Present Illness.—October 28, this year, he came with pain in the back, fever, and prostration. Eight ounces of pus were evacuated through old sinus; now further retention evident. Urine contained albumen and casts.

Operation, by Dr. McBurney, November 7, 1892. Enlargement of sinus and drainage of a considerable pus-cavity in loin.

Wound Healing.—The wound continued to discharge a good deal of pus. The patient ran a septic pulse and temperature, and died from exhaustion November 16, 1892.

CASE V.—(*Pyonephrosis; Incision.*)—A. S., aged thirty years, female, was admitted July 26, 1894.

Previous History (Notes from Medical Ward).—Ill health for six years. Recently pain in the right side, dyspnœa, no cough. Temperature, 102.4° F.; respiration, 42. Dulness and bronchial breathing in right side.

Diagnosis.—Pleurisy with effusion. A week later pain in the right loin. An ill-defined mass was felt in this region. Urine, specific gravity, 1020; 30 per cent. albumen; a few red and white cells. In twenty-four hours from ten to thirty-four ounces.

Physical Examination.—July 16, while being examined, patient passed a quantity of bloody urine containing shreds of fibrin. July 25: Vomited eight ounces of a yellow fluid of ammoniacal odor, containing urea and triple phosphates. The tumor in the loin was reduced in size and less painful. July 26: Transferred to Surgical Ward. Urine contained much pus. August 2: Left ureter catheterized. Urine contained 30 per cent. of albumen and red cells.

Operation, August 7, by Dr. Hartley. Incision in the right semilunar line. Abscess opened between the posterior border of the liver and the upper and outer border of the right kidney. Posterior counter-opening for drainage. Abdominal wound partly sutured and packed. Died next day.

Pathological Report.—There was an abscess-cavity communicating with the right kidney; the cavity extended upward behind the liver to the diaphragm. The kidney was surrounded by dense connective tissue. The pelvis was greatly dilated. The kidney-tissue was atrophied, and its interior formed with the dilated pelvis a large abscess or pus-sac. At one point the abscess appeared to communicate with the calibre of the adherent duodenum. The left kidney was congested; there was no peritonitis and no fluid in the right pleura.

CASE VI.—(*Pyonephrosis; Nephrotomy.*)—Beatrice S., aged twenty-four years, married, was admitted April 9, 1895.

Previous History.—Well until childbirth, November 24, 1894.

Present Illness.—On that date instrumental delivery. Catheterization practised for some days, infecting the bladder and causing cystitis. The patient did not regain her strength. January 2, 1895, chill, fever, and sweating; pain in the left lumbar region; purulent urine. A pain had continued; frequency with ardor; persistent diarrhoea. She was weak and emaciated.

Physical Examination.—A mass could be felt in the left lumbar region, extending to the median line in front and to the level of the umbilicus below. Urine, specific gravity, 1015; alkaline; good deal of albumen; a few pus-cells; no tubercle bacilli. She had moderate continued fever.

Operation, by Dr. McBurney, April 20, 1895. Six-inch incision below the ribs, beginning two inches from the median line in front. The tumor contained fluid. There was much local peritonitis. This wound was then closed, and the kidney exposed through an extraperitoneal lumbar incision. Incision of the kidney evacuated a large amount of pus. Cavity drained and packed.

Wound Healing.—The abdominal wound healed for the most part *per primam*. The kidney was drained through a large rubber tube in the loin, and the patient was discharged improved in general health with a sinus.

Subsequent History.—Remained in fair general health, but returned, May 12, 1896, to have sinus closed. Urine negative. Sinus scraped May 13, 1896. Left the hospital May 20, 1896, with sinus still present, but clean.

CASE VII.—(*Double Pyonephrosis; Uræmia.*)—Geo. M., age not stated, was admitted November 4, 1896.

Previous History.—Operation, three years ago, for supposed stone in right ureter. Incision through the bladder unsuccessful. Fairly well until five months ago, then intermittent pyuria, painful and frequent urination. Since then his condition has grown steadily worse. Constant pain in right iliac region. Attacks of partial suppression and uræmia. He has lost flesh and strength.

Physical Examination.—Emaciated and weak; intellect dull; speech halting. There was a large, deep-seated, tender mass in the right iliac fossa, of smooth surface and oval outline. Tense and immovable. Temperature, 97.6° F.; pulse, 112. Urine alkaline; specific gravity, 1010; albumen; pus and triple phosphates.

Operation, November 4, 1896, by Dr. McBurney. A four-inch oblique lumbar cut, parallel to twelfth rib, and one inch below it. Kidney enlarged, incised transversely, and a large amount of fetid pus evacuated from the dilated pelvis and the ureter, which latter admitted a sponge on holder its entire length. Tube-drainage and packing. The patient ran an aseptic temperature, but died of uræmia on the eighteenth day, November 22, 1896.

Autopsy showed the other kidney the seat of suppurative nephritis.

CASE VIII.—(*Pyonephrosis; Nephrectomy.*)—James C., aged twenty-six years, was admitted June 23, 1897.

Previous History.—An alcoholic syphilitic. Sixteen days ago, after severe muscular effort in lifting, pain in the right hypochondrium, continued sharp and constant. Next day, chill and fever and vomiting. Urine diminished in quantity.

Physical Examination.—Nutrition fair; pale; thorax negative; tenderness and muscular rigidity between the right costal border and the iliac crest, extending well forward towards the median line. Moderate continued fever; urine cloudy, acid; specific gravity, 1019; considerable pus. July 9 slight continuous fever. The quantity of pus was increased in urine. There was a well-marked tumor in the right side of the abdomen and loin, dull on percussion.

Operation, July 9, 1897, by Dr. Abbe. A five-inch oblique lumbar incision one-half inch below the twelfth rib. Kidney exposed. It formed a mere sac of pus. Enucleation by blunt dissection. Ligature of ureter some distance below the kidney with catgut. Separate catgut ligature of the vessels. The tumor showed no evidences of tuberculosis. The kidney-tissue entirely destroyed by suppuration. Wound healing aseptic, it was reduced to a two-and-a-half inch sinus, December 15, 1897. December 30, 1897, Dr. McBurney curetted and packed this sinus. Discharged, in fair general health, February 28, 1898. Sinus still open.

Subsequent History.—Not found.

CASE IX.—(*Pyonephrosis; Nephrectomy.*)—Martha C., aged twenty-nine years, married.

Previous History.—Seven or eight years ago patient passed a calculus *per urethram*. Three weeks ago she began to have a

steady, sharp, and severe pain, localized in the right lumbar region, which continued. At the beginning of the attack vomited several times and was much prostrated. Urine at the beginning of the attack was thick with sediment, dark-red in color, and diminished in quantity. She noticed a lump in the right lumbar region for the past seven years, which has been gradually increasing in size. Miscarriage, at five months, three days before admission to hospital. On admission temperature was 104° F.; pulse, 130.

Operation, August 13, 1897, by Dr. Abbe. A four-and-a-half-inch cut parallel to crest of ilium and two inches above anterior portion of crest. Muscles separated without cutting the fibres. Peritoneum stripped away towards median line and mass encountered, which burst, giving escape to a large amount of pus and *débris*. Cavity washed out with normal salt solution. Calculus felt in funnel-shaped ureter and then another; both removed. Kidney found to be converted into a very large pus-sac, with soft friable walls. The sac was gradually dissected out with fingers; vessels tied with heavy silk, ends of which were left long. A portion of this sac was left behind. Iodoform gauze packing. Salt infusion.

Wound Healing.—Patient ran a moderate febrile temperature after operation, her urine remaining of sufficient quantity and contained pus and blood. Wound, when dressed on the fourth day, was not clean, but was draining well. On September 30 the wound was reduced to a small clean sinus, and patient left the hospital in fair health. On October 9, 1897, condition of urine not noted.

TUBERCULOSIS OF THE KIDNEY.

The cases of tuberculosis of the kidney numbered nine,—three males and six females. Their average age was twenty-four years. The oldest was thirty-five, the youngest fourteen years old.

Symptoms referable to the urinary apparatus had been present on an average of three and a half years. One patient had had frequent urination and cloudy urine for as long as she could remember. In one case frequent urination had existed for some years, but had been accompanied by ardor

urinæ for ten months only. Hæmaturia had occurred in five cases. In two cases blood had been passed in large amount. In all cases but one the urine was distinctly purulent. In eight cases the symptoms were referred chiefly to the bladder. In seven cases there had been more or less pain or discomfort referred to the loin as well. In two cases tubercle bacilli had been found in the urine. In six cases a distinct enlargement of the kidney was felt. In six cases the kidney region was tender on pressure. In three cases palpation of the loin did not cause pain. In three cases the attempt was made to catheterize the ureters. In one of these the ureters were not found. In one case no urine passed through the catheter on the side of the disease. In one case the diagnosis was verified by catheterization of the ureters. In five cases fever was present on admission to the hospital. In four cases the temperature was normal. In all cases the general health had suffered markedly. In one case an ulcer existed in the bladder, scrapings from which were pronounced not tuberculous. In one case there had been tuberculous coxitis.

Two of the cases were interesting from a diagnostic point of view. In both the symptoms simulated those of renal calculus precisely. Attacks of renal colic and hæmaturia were the prominent symptoms. In both the kidney contained circumscribed foci of tuberculosis. In Case IV, not of great size, one such focus existed, in the two other, two foci. The remainder of the kidney appeared healthy in each case.

Eight cases were treated by nephrectomy. Five by the transperitoneal operation, and three by extraperitoneal nephrectomy. In no case was a large part of the ureter removed. Salt infusion in three cases. Of these eight cases seven recovered from the immediate effects of the operation. The eighth died of uræmia on the tenth day. The remaining kidney was found cystic and functionless with an impervious ureter, although by direct palpation it appeared normal. Of the seven remaining cases, one died forty-seven

days after operation, from acute phthisis or acute general miliary tuberculosis. One died eight months later of uræmia caused by complete blocking of the remaining ureter by a stone, producing anuria. One is in good health six years after operation, without urinary signs or symptoms. One is in fair health five years after operation, but has had several attacks of hæmaturia during this period. One left the hospital well one month ago. No urinary symptoms. One left the hospital one year ago with cystitis, but in fair general health. One left the hospital one year ago greatly improved in general health; urine slightly purulent. Three months ago was still well. The ureter was healthy. In the ninth case two tubercular foci were removed with the curette, from the upper lower and upper poles of the kidney respectively. The patient remained in good general health for three and one-half years, when he had a severe attack of hæmaturia, which lasted for three days; at present, five months later, no further hæmaturia. General health good. He suffers at times from ardor urinæ.

CASE I.—(*Renal Tuberculosis; Incision and Drainage; later Nephrectomy.*)—Maude C., single, aged 23 years, was admitted April 4, 1892.

Previous History.—Five years ago began to suffer from ardor urinæ and frequency, which has persisted.

Present Illness.—Three months ago began to lose strength and flesh, and noticed a painful point just below the twelfth rib, over the right kidney. The area of tenderness increased; chills and fever and night-sweats occurred, with loss of appetite. Four weeks ago a sudden discharge of pus and blood occurred from the vagina. The patient has grown steadily worse.

Physical Examination.—There was a tender swelling of moderate size to be felt in the region of the right kidney. Urine turbid, amber, acid; specific gravity, 1004; a moderate amount of pus.

Operation, by Dr. McBurney, April 9, 1892. Incision and drainage in the left lumbar region of a large tuberculous perirenal abscess. The kidney was found enlarged and irregular in

outline; several pockets containing pus and cheesy material evacuated from the kidney. Wound packed.

Wound Healing.—Moderate fever and purulent discharge; some improvement of general health; a considerable cavity left beneath the last two ribs when she left the hospital, June 11, 1892.

Pathological Report of Scrapings from the Kidney.—Diffuse tubercle-tissue containing giant-cells; cheesy material. Patient was readmitted to the hospital November 17, 1892. In the middle of the scar there was a sinus three inches deep, discharging pus. General condition fairly good. Urine normal.

Operation, by Dr. McBurney, December 5, 1892. Transperitoneal nephrectomy. Incision in the right semilunar line. Clamps left upon pedicle. The kidney was twice its normal size and was riddled with large tuberculous abscess-cavities. The kidney-tissue was destroyed.

Wound Healing.—Clamps removed in forty-eight hours. Two salt infusions on account of feeble pulse. The wound healed by granulation completely, and she left the hospital on April 15, 1893, greatly improved in general health. Seen September, 1898. In fair general health; has worked for her living since 1893. No evidence of tuberculosis.

CASE II.—(*Renal Tuberculosis; Nephrectomy.*)—M. G., female, single, aged thirty-two years, was admitted April 12, 1893.

Previous History.—Frequent urination for six years with ardor urinæ. One month ago patient noticed a lump in left side of the abdomen.

Physical Examination.—There was a smooth, rounded, movable tumor, twice the size of a kidney, in the left side of the abdomen. Neither tender nor painful, but elastic. Aspirator-needle introduced into the tumor through the loin, and withdrew pus.

Urine contained much pus and granular casts, also many tubercle bacilli.

Operation, by Dr. McBurney, April 22, 1893. Incision in left semilunar line six inches in length. Peritoneum stripped away from the kidney outside of colon. Artery, vein, and ureter ligated with separate catgut ligatures, and the tumor removed. The tumor was lobulated, five by four by three inches. The tumor

consists of a series of sacs containing blood, pus, and cheesy material.

The stump of the ureter was cauterized and sewed to the lower angle of external wound. Glass drain and packing. Partial suture of the external wound.

Wound Healing.—By granulation chiefly. Discharged July 7, 1893, much improved in flesh and strength; a clean sinus is still present in the loin. Urine contains a little pus.

Subsequent History.—At present, five and a half years after operation, the patient's general health is said not to be very good. She has had several attacks of hæmaturia since the operation, which have made her ill, and she has, after one attack, been confined to bed for three months.

CASE III.—(*Renal Tuberculosis.*)—Richard S., aged thirty-three years, was admitted November 20, 1894.

Previous History.—Numerous attacks of gonorrhœa. Ardor urinæ felt in glans penis for the past seven years, also pain in glans independent of urination. Several attacks of iliac pain resembling renal colic. Occasional bloody urine. Six months ago bladder filled with clots. Retention of urine; perineal drainage and evacuation of large clots, since then no bleeding, other symptoms persist.

Physical Examination.—Urethra patent. Tenderness in left iliac region. Urine, specific gravity, 1030; acid, cloudy, much pus, no tubercle bacilli. December 9, attack of iliac pain. The amount of pus increased after the attack had subsided.

Operation, December 24, 1894, by Dr. McBurney. Four-inch cut parallel to the twelfth rib. The capsule of the kidney is thickened; upper end of the kidney incised and an abscess containing five drachms of pus evacuated. At the lower end of the kidney another incision, and removal of a mass of granulation-tissue by the curette.

Pathological Report.—Diffuse tubercle-tissue. Wound healed by granulation. Discharged with a sinus, improved, January 29, 1895.

Subsequent History.—The sinus did not close, and the patient entered the hospital, having enjoyed good general health until within a day or two of admission, June 7, 1898. A day or two before he had suffered from retention of urine, and had passed

a catheter upon himself, and withdrew fluid blood and clots from his bladder.

Upon entering the hospital he was catheterized and bloody urine was withdrawn. The hæmaturia ceased and did not recur up to the present time, September, 1898. He still has a small sinus in the loin and suffers at times from scalding urination. His general health he describes as good. He suffers also from pain and stiffness of the left shoulder-joint.

CASE IV.—(*Renal Tuberculosis; Nephrectomy.*)—Clara B., aged twenty-one years, single, was admitted October 31, 1895.

Previous History.—Family history of phthisis. She has had always frequent urination, and as long as she can remember cloudy urine. Two years ago she began to have attacks of pain in the left loin, shooting into groin and thigh, with nausea and vomiting; during the attacks, which lasted from six to twenty-four hours, no urine was passed, after which frequent urination and incontinence. Patient had constant desire to urinate between the attacks. Of late attacks more frequent, sometimes accompanied by a chill and fever. Has lost strength and flesh. For the past six months has noticed a lump in the left loin, which disappears at times.

Physical Examination.—Left kidney enlarged and somewhat tender. Urine alkaline; much albumen and pus; no tubercle bacilli; abundant growth of streptococci.

Operation, by Dr. McBurney, November 2, 1895. Incision convex downward below the ribs, transperitoneal. Left kidney enlarged and hard, but movable. The right felt normal. The left kidney easily separated. Vessels tied with catgut. The ureter, as thick as a finger, was cut, cauterized, tied, and sewed in the lower end of the wound, which was closed, except at its posterior angle.

Pathological Report on Left Kidney.—Organ much enlarged; its surface studded with miliary tubercular abscesses. The pelvis is dilated, and the calyces are converted into ulcerating sacs. There are small abscesses scattered throughout the substance of the organ, the cortex is thickened and infiltrated with tubercle-tissue.

Wound remained clean. The patient passed no urine after the operation. She had diarrhœa and vomiting, and later coma. Died on the tenth day.

Autopsy.—The right kidney was smaller than normal, and apparently contained no kidney-tissue. It was made up of multiple cysts, some of them containing clear serous fluid, others a thick white paste. The ureter was impervious. The left ureter was dilated and filled with pus and urine; its wall was the seat of chronic (tubercular) inflammation. The bladder was represented by a sac three-quarters of an inch in diameter, where the ureters came together, leading to a narrow urethra. The orifice of the right ureter was impervious.

CASE V.—(*Movable Kidney and Renal Tuberculosis; Nephrorrhaphy; Nephrectomy.*)—Katherine T., aged twenty-seven years, married, was admitted December 26, 1895.

Previous History.—Four years ago had hæmaturia, lasting twenty-four hours. Some months later another attack, with severe pain in left lumbar region shooting down to groin. Many such attacks followed. At present constant pain in the back. Right kidney palpable and movable. Urine alkaline; specific gravity, 1014; pus.

Operation, December 28, 1895, by Dr. McBurney. Exploration of left kidney shows it not to be abnormally mobile. Right kidney exposed and fixed by splitting capsule and suture.

Wound healing aseptic.

Left hospital improved. Wound healed. Urine still purulent.

Subsequent History.—Two years later, in November, 1897, re-entered hospital.

Two months after leaving the hospital the first time she had an attack of hæmaturia, accompanied by painful and frequent urination and pain over the left kidney. Ten months ago she had another similar attack. Two weeks ago another attack.

Physical Examination.—Scars of former operations. Patient is small, pale, and anæmic. Nothing felt in the abdomen. Temperature, 98.4° F.; pulse, 100. Urine neutral; specific gravity, 1016; albumen, trace; blood.

November 6, 1897, under ether, the urethra was dilated and the ureters catheterized. Bloody urine was seen to escape from the left ureter.

Operation, November 9, 1897, by Dr. McBurney. Five-inch cut in left loin curved convex downward, just below the ribs. Middle of cut in midaxillary line. Extraperitoneal blunt dissec-

tion, exposing and freeing the kidney from its attachments. Artery and vein tied with catgut. Ureter cut; its lumen cauterized; stump ligated and again cauterized. Gauze packing for drainage; partial suture of the wound.

Pathological Report.—Pelvis of kidney and its calyces contained clots. A tubercular abscess, about the size of a hickory-nut, situated in the substance of the organ, at junction of middle and lower thirds of the organ. It contained cheesy white material, evidently tubercular.

Wound healing aseptic. November 25, urine still slightly purulent. Wound small and clean. Left the hospital, November 26, 1897, well. In good health at present writing.

CASE VI.—(*Tubercular Nephritis; Nephrectomy.*)—Henry S., male, aged twenty-one years, was admitted January 13, 1896.

Previous History.—Tubercular arthritis of hip in childhood. Cured with a stiff joint. Five and a half years ago frequent urination, cloudy urine, pain in the perineum. Six months later attacks of hæmaturia. Bladder drained above the pubes for several months without relief. At present there is pain in the right lumbar region.

Physical Examination.—Signs of old tubercular coxitis. Pain on pressure over the right kidney, which is enlarged. Urine alkaline; specific gravity, 1020; pus, blood, and triple phosphates.

Operation, January 18, 1896, by Dr. McBurney. Eight-inch cut below the ribs from outer border of rectus, convex downward, to the border of erector spinæ. Peritoneum opened; much perinephritis; blunt enucleation. Ureter much thickened, clamped, also artery. Catgut ligature of vein. Kidney removed. Clamps left *in situ* on artery and ureter. Partial suture; sterile packing; salt infusion.

Wound Healing.—Urine abundant after operation. Clamps removed on third day. Slight infection of wound. February 29 left hospital with sinus. November 12 returned, after eight months. He had been much improved in health, complaining only of moderate frequency, but his urine was not improved, and he had had several attacks of hæmaturia. Four days ago severe pain in the left hypochondrium. Since then anuria.

Physical Examination.—The patient was pale; anorexia, constipation, pain, rigidity, and tenderness over the left kidney in front and behind. Catheter withdrew from bladder a drachm of

pus. Temperature, subnormal; pulse, 68. Intravenous salt infusion. November 14: Œdema of the face and extremities, contracted pupil, coma, stertorous breathing, heart-failure, death.

Autopsy.—Showed pelvis of left kidney completely plugged by a stone. The left kidney showed signs of advanced degeneration, tubercular in character.

CASE VII.—(*Tubercular Nephritis; Nephrectomy; Tubercular Cystitis; Vesico-Vaginal Fistula.*)—Elizabeth S., aged fourteen years, single, was admitted March 10, 1896. Transferred from the Gynæcological Division.

Previous History.—Long history of frequent urination day and night. About ten months ago began to have pain in vesical neck. Considerable frequency accompanied the pain. At the present time constant desire to urinate and considerable pain in urethra. Urine is at times bloody. No pain in kidney regions.

Physical Examination.—Emaciated child. Temperature, 101.5° F.; pulse, 120; no cough. Urine alkaline and very purulent. Tubercle bacilli not found. Urethra dilated and interior of bladder explored by Dr. Cragin. February 18: Ulceration of bladder found and mucous membrane curetted; also a vesico-vaginal fistula was made for drainage. Ureters not found. Examination of bladder: scrapings show no evidence of tuberculosis under the microscope. Constant irrigation five hours daily with Bozeman's irrigator. February 23: Some tenderness over the kidney. Urine contains much pus and albumen; no casts.

March 10: The lower edge of an enlarged kidney felt, which is tender on pressure.

March 14, 1896, operation by Dr. McBurney. Incision in left linea semilunaris; peritoneum opened and right kidney palpated; it feels normal. Incision enlarged by a cut outward two inches below last rib and parallel to it. Peritoneum pushed towards the median line. Much enlarged left kidney exposed; not many adhesions. Ureter clamped just below pelvis. Renal vessels clamped, and all divided on kidney side. Kidney removed. Clamps left *in situ*. Gauze packing. Suture of peritoneal wound. Suture of anterior portion of superficial wound.

Pathological Report.—Not many perirenal adhesions. The organ was six inches in length. Larger at the lower pole. The surface was smooth. On section the kidney is riddled with tuberculous abscesses of large size. The abscesses communicated

one with another, especially at the lower part of the organ. The cavities are filled with tuberculous pus and broken-down tuberculous tissue. The remainder of the organ appeared to have undergone a waxy degeneration.

The patient made a good recovery from the operation, and the wound gradually closed down to a sinus. The amount of pain in the bladder also diminished, and the cystitis improved in character. She gained much flesh and strength, and left the hospital, May, 1896, in fair general health, but with a sinus in the loin at the site of operation, and a vesico-vaginal fistula.

On March 26, 1897, she returned for the cure of these two conditions, which had persisted up to that time. Examination showed her to be at that time fairly nourished, but pale. There was a tubercular sinus at the posterior end of the old scar two and one-half inches deep, which continually discharged pus. The vesico-vaginal fistula was patent and caused the patient much annoyance.

Operation, March 30, 1897, by Dr. McBurney. The walls of the sinus in the loin were cut away and all diseased tissue removed with the knife and curette.

The sinus in the loin closed, and the patient left the hospital, improved in general health, with the vesico-vaginal fistula still open, August 15, 1897.

CASE VIII.—(*Tubercular Nephritis; Phthisis; Nephrectomy.*)—Henry W., aged fifteen years, was admitted October 4, 1897, transferred from Medical Ward.

Previous History.—Two years ago had hæmaturia. This continued at intervals for a year. Since that time the urine has been free from blood. For two years past, ardor urinæ and pain in glans penis during urination. He has lost flesh and strength. Appetite good.

Physical Examination.—Patient pale and poorly nourished. Temperature, 99.6° F.; pulse, 112. Urine acid; specific gravity, 1008; albumen, a trace. Blood examination showed hæmoglobin diminished to 60 per cent. Daily evening rise of temperature, 101° to 103°. No pain except during urination. Tubercle bacilli have been found twice in the urine.

The left kidney was enlarged, movable, not tender; surface smooth and firm. Transferred to Surgical Ward.

Operation, by Dr. Abbe, October 9, 1897. Five-inch cut

parallel to fibres of external oblique muscle, beginning one and one-half inches from left anterior superior spine and internal to it, and running upward, backward, and outward. Abdominal muscles split without cutting fibres down to peritoneum. Extra-peritoneal exposure and enucleation of kidney by blunt dissection. Pedicle tied with heavy silk ligature and kidney removed. Wound packed with sterile gauze. Suture of lower portion of wound.

Pathological Report.—Kidney nine by four inches. Surface firm and smooth, except behind, where a caseating focus has nearly burst through the capsule. On section the surface is gray, streaked with yellow, firm consistence.

Wound Healing.—The urine, after operation, was sufficient in quantity but purulent.

The patient ran a febrile temperature after the operation, but felt pretty well until about a month after the operation, when he began to cough a great deal and to have a profuse expectoration, muco-purulent in character, and to have night-sweats and fever.

November 15: Signs of consolidation of right lung posteriorly and râles all over chest. From this time he began to lose ground and became very weak. His wound remained open, and urine ran from bladder through the wound opening in the loin. Died, exhausted, November 25, 1897.

CASE IX.—(*Tubercular Nephritis; Nephrotomy; later Nephrectomy.*)—Mary C., aged thirty-five years, single, was admitted May 13, 1898.

Previous History.—Rather feeble woman for many years. For several years she has had a sense of discomfort in the left side of abdomen, but never any distinct pain. Nine months ago she began to have a dull pain in the left side of the abdomen, which extended downward into her hip and thigh, also ardor urinæ. Six weeks ago patient had become so weak and sick that she was confined to her bed. She had a chill and fever and felt a sense of fulness in left side of abdomen and increased pain. Her condition has since that time remained about the same; a chill followed by fever having occurred from time to time. Three days ago the pain was much worse, then something seemed to burst inside of her; she passed some pure pus from bladder and felt relieved.

Physical Examination.—Tall, poorly nourished woman. A tumor in the left side of the abdomen extending from free border of the ribs to within one and one-half inches of crest of ilium and from median line to lumbar region. Tumor was irregularly oval in shape, tense, and caused a visible bulging in the left loin. Somewhat movable, slightly tender. Temperature, 101.2° F.; pulse, 110. Urine, alkaline; specific gravity, 1024; albumen a considerable amount; much pus.

Operation, by Dr. McBurney, May 14, 1898. Three-inch cut parallel to free border of ribs in left loin. After dividing the muscles a fluctuating mass was exposed containing pus. Incision of abscess evacuated eight ounces of foul-smelling pus. Did not resemble tuberculous pus. No stone felt. Wound packed with sterile gauze.

Wound Healing.—The wound continued to discharge considerable pus, and the urine continued purulent. Neither tubercle bacilli nor gonococci were found after repeated examinations. A sinus persisted in the loin.

August 8, 1898: Ureteral catheter passed into left ureter, and then into right ureter; both catheters left in place. Urine from right ureter bloody. No urine from left ureter.

Operation, August 12, 1898, by Dr. Abbe. Sinus in loin curetted and packed. Scar and sinus excised down to kidney. Kidney dissected free from surroundings; many adhesions and peritoneum torn. Ureter and vessels ligated with heavy catgut and kidney cut away. Wound packed with iodoform gauze. The ureter was greatly thickened.

Pathological Report.—Kidney enlarged from tuberculosis, with much secondary pyogenic infection.

Wound Healing.—Patient very weak for some days, but rallied, and wound healed rapidly down to a sinus. She left the hospital, greatly improved in condition with a sinus, September 25, 1898, to return for dressing. Wound not purulent.

RENAL CALCULUS.

The cases of renal calculus numbered twelve; nine males and three females. Their average age was twenty-seven years. The youngest fifteen; the oldest fifty years of age. The longest duration of the symptoms had been twenty-four

years; the shortest, four months. In seven cases there had been a history of typical attacks of renal pain radiating downward. In five cases the pain was referred to the back and loin merely. In three cases no change had been noticed in the urine. Hæmaturia and pyuria were noticed in one case; hæmaturia alone in four cases; and pyuria alone in four cases. There had been a history of intermittent hydronephrosis in one case, and of intermittent pyonephrosis in one case.

Eleven cases were treated by nephrotomy, one case by nephrectomy. In six cases one or more stones were removed from the kidney-substance. In two cases a stone was removed from the renal pelvis or ureter. In one case both kidney and ureter contained stones. In three cases no stone was found, but the symptoms and the condition of the urine pointed so definitely to the existence of calculus, or some other organic lesion, that the writer has preferred to retain them under the heading "Renal Calculus." In one of these cases a number of calculi had previously been passed *per urethram* at various times. The incisions used for the exploration of these kidneys were usually oblique or parallel to the ribs in the loin.

Stones were sought for in the kidney by palpation, needle puncture, and by incision of the kidney-substance, in such direction as seemed to give easiest access to the stone. Usually the kidney was incised longitudinally. The pelvis was entered through a cut in the kidney-substance. Bleeding was usually controlled by packing; occasionally by sutures passed through the kidney-substance.

In two cases the patients had been treated for several years for disease of the spine, under mistaken diagnosis. In one case a moderate scoliosis existed which was supposed to account for the constant and paroxysmal pain from which he suffered. Radiographs taken to illustrate the bony deformity showed the presence of an opacity in the region of the left kidney, and by operation a single large calculus was removed from the substance of this organ.

In the other case the patient had been treated for spinal

caries for several years, and had constantly worn a plaster jacket without benefit. A large abscess had formed in the loin a few years before, and a sinus existed when he entered the hospital. A considerable number of large stones were removed from the bottom of this sinus, into which they had made their way by suppuration from the kidney. In both these cases the urine was negative.

Among these twelve cases there was one death (Case I), in which case suppurative nephritis and chronic diffuse nephritis existed as complications.

The results in the remaining eleven cases were as follows:

Case II. Large stones removed from bottom of lumbar sinus. Left the hospital well, and has remained in good health six years after operation.

Case III. No stone found. Left hospital apparently well. No return of symptoms since.

Case IV. Several very large stones removed from kidney-substance. Left the hospital well. No return of symptoms since.

Case V. Single, small, oxalate stone removed from upper part of ureter through incision in kidney-substance. Left the hospital, well, three years ago; remained well for a year. At present he again suffers from pyuria, hæmaturia, and attacks of renal colic.

Case VI. Fracture of the spine, paraplegia, chronic cystitis, pyelitis, pyonephrosis, and renal calculus. Stone removed from renal pelvis and kidney drained. No return of stone symptoms after three years. General condition as before.

Case VII. No stone found. Suppuration of wound. Left the hospital free from pain. Has remained in good health since, two years.

Case VIII. Stone removed from substance of kidney. Pain returned before leaving hospital. Subsequent history not known.

Case IX. Life-long history of renal pain, and many

calculi passed *per urethram* during a period of twenty-two years. Renal abscess and nephrectomy in Baltimore. Sinus in loin, from which several stones were removed. Left hospital well. Subsequent history not known.

Case X. Intermittent hydronephrosis since three years; tumor in right lumbar region; nephrectomy; kidney degenerated into a cyst which contained a number of spherical calculi of buck-shot size. Prompt recovery, with restoration of health to date of report.

Case XI. Renal colic and steady pain in loin; hæmaturia and pyuria. Kidney exposed; nothing found. Left hospital, well, one year ago, and remains well at present time.

Case XII. Scoliosis. Single large stone removed from kidney. Has been in excellent health since the operation, six months ago.

CASE I.—James W. M., aged thirty-one years, male, was admitted January 28, 1891.

Previous History.—Attacks of renal pain for past five years. Three years ago severe attack lasting two weeks with hæmaturia. One year ago another attack similar in character.

Present Illness.—The patient's symptoms have persisted up to the present time.

Physical Examination.—No tumor felt in kidney region. Urine, albumen, pus, and blood. Cystoscopic examination negative.

Operation, by Dr. McBurney, March 21, 1891. Oblique lumbar incision, five inches in length, from the anterior border of the longissimus dorsi, near the twelfth rib, downward and forward. Kidney in a high position and immovable. On the outer border of the kidney an indented scar. A needle introduced at this point touches a stone. By blunt dissection a stone was removed from a cavity within the kidney having dense fibrous walls. The stone consisted of urates. Suture of external wound with drainage down to the kidney.

Wound Healing.—The function of the kidneys much diminished for five days. The patient developed fever, became weak, and could not retain food, and although the appearance of the

wound was satisfactory, he died April 2, nine days after the operation.

Pathological Report.—The kidney was enlarged to double its size. It consisted of a sac of pus, most of the kidney-tissue being destroyed. The sac which enclosed the stone was separated from the abscess-cavity by a thin fibrous wall.

CASE II.—G. C., male, aged fifty years, was admitted September 19, 1892.

Previous History.—Vesical calculus when a child.

Present Illness.—Three years ago began to have pain in the lumbar region. Two and one-half years ago an abscess formed in the right loin, and was opened. He has been under treatment since for spinal caries, and has constantly worn a plaster jacket. The sinus has remained open and continues to discharge pus. His general health is fair. Urine negative.

Operation, September 20, 1892, by Dr. Hartley. Excision of sinus and removal of several calculi from its bottom. The stones were from one inch to one and one-half inches in diameter. Some of them smaller. The kidney was not disturbed. The wound healed by granulation, and he left the hospital February 4, 1893.

Subsequent History.—He continued to suffer for a time from some frequency, and his urine contained pus for a number of months. These symptoms gradually disappeared, and in September, 1898, he is in good health without sign of trouble in his genito-urinary apparatus.

CASE III.—Robert L. J., aged thirty-one years, was admitted January 16, 1895.

Previous History.—Three years ago had an attack of pain in the right loin extending into the groin, accompanied by chills and fever; very severe pain and suppression of urine, lasting thirty-six hours. Onset of attack very sudden. This attack has been repeated. Since then he has a constant sore feeling in back, occasional hæmaturia; has passed a few small stones after attacks, which occur every two or three weeks. He is ill in bed half the time. Urine, specific gravity, 1003; acid; a few white cells.

Physical Examination.—Pain on pressure over the right kidney, before and behind.

Operation, January 16, 1895, by Dr. McBurney. Six-inch

oblique lumbar cut parallel to the last rib. Right kidney exposed, palpated, and punctured; no stone found. Wound sutured and packed. Wound healing aseptic. Left hospital February 10, 1895; no pain; wound healed.

Subsequent History.—Has remained free from former symptoms.

CASE IV.—Francis B., aged forty-nine years, was admitted February 5, 1895.

Previous History.—For twelve years pyuria and lumbar pains. Five years ago renal colic and passage of a pea-sized stone. Four years ago another. Since then constant lumbar pains; two months ago, chills and fever, prostration, delirium, pain in the groin; much pus passed at the end of the attack. One month ago cystoscopic examination seemed to show right ureter the source of pus. Pain has always been in the right groin. Urine, specific gravity, 1010; some pus.

Operation, February 6, 1895, by Dr. McBurney. Seven and one-half inches oblique lumbar cut. Right kidney exposed and palpated. One large and several small stones removed from its substance. Wound sutured and partly packed. Wound healing aseptic. February 7: Salt infusion on account of weak pulse and diminished urine. Stones: The largest stone, including fragment, weighed one ounce and two drachms. The largest fragment was two and one-quarter inches long, irregularly cylindrical in form, several projections upon its surface like branches of a tree. Six rounded stones of pea size.

After a somewhat slow convalescence, on account of morphine habit, he left the hospital March 24, 1895. Wound healed. Free from pain. Urine, specific gravity, 1014; negative; a trace of albumen.

Subsequent History.—Has remained in good health since operation.

CASE V.—Michael C., aged seventeen years, single, laborer, was admitted November 7, 1895.

Previous History.—For past seven years sudden attacks of sharp localized pain in the right hypochondrium, not radiating. Duration from one-half to two hours; attacks brought on by muscular effort; relieved by lying down. Slight hæmaturia three years ago.

Physical Examination.—Tenderness on pressure over point

of pain in right hypochondrium. Urine, acid; specific gravity, 1028; red and white cells.

Operation, November 10, 1895, by Dr. McBurney. Three-inch lumbar cut below the ribs, downward and forward from border of erector spinæ. Exposure of right kidney. Stone felt in upper end of ureter, and pushed into pelvis of kidney. Pelvis opened through cut in kidney-substance, and small stone removed. Oval in shape, one-half by one-third inch, and covered with sharp crystals. Wound in kidney closed by suture on account of bleeding. Suture of external wound and drainage. Wound healed aseptic. A good deal of pain for several days. Convalescence delayed by epididymitis, cystitis, and tonsillitis. Left the hospital December 19, 1895, with a superficial granulating wound, free from pain.

Subsequent History.—Remained well for one year. At present again suffers from hæmaturia, pyuria, frequent urination, and attacks of renal colic.

CASE VI.—(*Old Fracture of Spine; Cystitis; Pyelitis; Stone in Pelvis of Kidney; Pyonephrosis.*)—Henry M., aged twenty-one years, male, was admitted December 3, 1895.

Previous History.—Six years ago injury of spine. Operation in cervical region for paraplegia. Suffered from paralysis of bladder and cystitis. At present much muscular weakness of legs; cystitis. For past three weeks pain in region of right kidney. History of intermittent pyonephrosis.

Physical Examination.—Partial paraplegia. Right kidney enlarged and palpable, reaching down to iliac crest; can be pushed back to the normal position. Left kidney palpable and slightly movable.

Operation, by Dr. McBurney, December 10, 1895. Three-inch cut below and parallel to ribs in right loin. Movable kidney pushed into the wound and exposed. The organ appeared to be converted into a pus-sac. Incision into organ; evacuated a large amount of stinking pus; a stone was felt in the renal pelvis and was withdrawn with a forceps. The edges of the hole in the kidney were sutured to the edges of the abdominal wound, and drained with a strand of iodoform gauze. Wound packed.

The stone, soft and phosphatic, measured seven-eighths by one-half inch. It was dug out of one of the calyces.

Wound Healing.—The patient had a good deal of fever until

December 24, and wound discharged much pus. Urine purulent as before.

January 25: A sinus remained in the loin which discharged urine and pus. His general condition is improved. Cystitis as before.

Subsequent History.—No further attacks of pain in loin. Does not now suffer from cystitis. General condition as before.

CASE VII.—Albert B. H., aged twenty-nine years, was admitted November 16, 1896.

Previous History.—Four months ago severe pain over region of left kidney shooting into groin, testis retracted, prostration, nausea, and vomiting. Duration of attack three hours. In bed five days. A similar, though milder, attack on the right side after. Since then two severe attacks on the left side; last attack followed by hæmaturia for thirty hours. At present constant gnawing pain in the region of the left kidney.

Physical Examination.—Tenderness over left kidney in front and behind. Maximum point of tenderness on outer border of left rectus, opposite navel. Temperature, 99.6° F.; pulse, 100. Urine alkaline; specific gravity, 1022; triple phosphate and ammonium urate.

Operation, by Dr. McBurney, November 21, 1896. Exploration of left kidney through four-inch oblique lumbar incision. Kidney and ureter negative. Suture of wound; moderate suppuration. Left hospital December 19, 1896, and has since remained in good health.

CASE VIII.—Ruth B., aged fifteen years, was admitted May 5, 1897.

Previous History.—In October, 1894, when twelve years old, had a severe attack of pain in the left lumbar region, lasting several hours; again, about December 25 of the same year, a similar attack, and a third attack in February following. From this time on several attacks until October of the same year; after this the attacks became more frequent, sometimes every week, and were decidedly more severe.

In August, 1896, she began to have constant pain, even between the paroxysms, and at this time she began to deteriorate in general health. More severe attacks followed frequently up to the present time. The pain is intense; located in the left lumbar

region; increased by motion and sometimes inducing a state bordering on collapse.

Patient is tall and slender, fairly nourished, but pale. Decided tenderness over the left kidney. Temperature and pulse, normal. Urine, acid; specific gravity, 1016; no albumen; a few pus-cells.

Operation, by Dr. McBurney, May 5, 1897. Four-inch oblique lumbar incision from external border of erector spinæ on left side, passing obliquely forward and downward. Muscles cut and kidney exposed. There was a deep furrow passing transversely across the lower part of the kidney and below this furrow, embedded in the kidney-substance, and about a quarter of an inch from the surface was a calculus about one-half inch in diameter. This stone was of very friable consistence; it was broken into numerous fragments during removal. Wound washed out with sterile salt solution and partly closed with sutures, the remainder being packed with sterile gauze.

The wound healing was interrupted by infection and rather profuse suppuration, and the patient developed an annoying bronchitis, which lasted for several weeks. The wound broke down and sinuses developed, which were curetted on June 24, after which the wound closed. Before leaving the hospital the patient had several attacks of pain resembling those which occurred before operation. She left the hospital July 28, 1897.

Subsequent history unknown.

CASE IX.—P. A. G., female, aged twenty-six years, was admitted March 25, 1897.

Present Illness.—A long history of attacks of left renal colic since early childhood. When two years old passed several calculi *per urethram*. Six years ago an abscess formed in the left lumbar region, which discharged a large amount of pus. After this a sinus remained, from which a stone escaped. In 1894 left kidney was removed in Baltimore. This operation was followed by the formation of an abscess a year later, which broke externally and remained open. Several operations have since been done for the closure of this sinus. All have failed.

Physical Examination.—A frail, delicate-looking woman; pale. There is a broad scar four by five inches in the right lumbar region. There is a sinus, one-half inch in diameter, at its centre, surrounded by unhealthy granulations secreting a thick

pus. The sinus leads forward and then upward and inward; depth of sinus two and one-half inches. The walls of the sinus are firm and cicatricial and covered by unhealthy granulations. Temperature, 98.4° F.; pulse, 96. Urine, acid; specific gravity, 1020; trace of albumen, mixed with pus.

Operation, by Dr. McBurney, March 25, 1897. Sinus laid open and granulations scraped away; wound explored for any remains of fragment of kidney. At the extreme end of the sinus the finger encountered a hard substance. With the finger and curette a semilunar mass of dense tissue was scooped out one and one-half by three-quarters inches; in it were embedded two calculi. The larger, of irregular shape, bears a rough resemblance to an anvil; its largest diameter is about one-half inch. The smaller is spherical, and about the size of a buckshot. Some of the surrounding scar-tissue cut away. Sinus packed. Wound did not heal, and on June 24, 1897, a second operation was done, and the entire mass of scar-tissue was cut out, after which the cavity closed completely by granulation. The patient left the hospital, well, August 24, 1897.

Subsequent history not known.

CASE X.—M. V. B., female, aged forty-eight years, was admitted June 23, 1897.

Present Illness.—In 1891 a single well-marked attack of renal colic and the passage of many small pin-head-sized calculi.

Three years ago, following unusual muscular effort, patient had a dull pain in right lumbar region and a large mass developed in the right loin. All these symptoms vanished after a night in bed. The attacks have recurred at intervals of from three to six months, and their subsidence has been coincident with the passage of a large amount of urine. For past nine months the attacks have been more frequent,—every ten days. They have been accompanied by chills, nausea, and flatulence, dull pain in right lumbar region and right side of abdomen, and a sensation of fulness and dragging. The tumor was less prominent after rest in a recumbent position, but of late the diminution in size has been less marked. Last attack was three weeks ago. The mass in loin was very large, but after three days in bed almost disappeared. Urine, amber, acid; specific gravity, 1012; albumen a trace. The quantity passed in twenty-four hours varied

very much from day to day, being sometimes much above the normal and on other days very small in amount.

Physical Examination.—Patient was well nourished and healthy in appearance. The right side of the abdomen was prominent. A large tumor was made out occupying the whole right side of the abdomen and extending beyond the median line. It was rounded, surface smooth and tense, the tumor was somewhat movable and obscurely fluctuating,—not tender. On percussion, dulness continuous with the percussion note of the liver. Temperature, 100° F.; pulse, 84.

Operation, by Dr. McBurney, June 25, 1897. Cut from one inch below the tip of eleventh rib inward to outer border of right rectus, describing a curve convex downward. Muscles divided in line of the incision and peritoneum opened. Hand introduced into the peritoneal cavity and the left kidney palpated. It felt normal. Peritoneum then pushed away to the median line and the large cystic tumor exposed. On account of its great size the incision was enlarged by a vertical cut along the outer border of the rectus as far downward as the level of the anterior superior spine. Peritoneum was stripped off the front of the cyst towards the median line. The tumor was enucleated by blunt dissection with hands, and delivered through the wound. Ligature of renal vessels with catgut and a clamp applied to them nearer the kidney. Ureter cut between catgut ligatures. Lower end of ureter cauterized before the lower ligature was tightened. Vessels cut, and ureter and tumor removed. Suture of wound, except the outer two inches of horizontal part, left open for drainage by gauze packing.

Pathological Report.—Cystic tumor of renal origin. Twelve by six by six inches. The sac is fully distended with clear yellow fluid to the amount of many ounces. Something like the shape of the kidney, but elongated. Pelvis dilated. Surface of tumor smooth, with large rounded elevations corresponding to a series of irregular intercommunicating chambers in the interior. The wall is of variable thickness, in some situations quite thin. Within the cyst are a number of spherical calculi of buckshot size. One or other of these calculi has from time to time lodged at the entrance to ureter, and, acting as a ball-valve, has allowed the escape of a variable quantity of urine at different periods, depending upon the position assumed.

Wound Healing.—Moderate suppuration of lower part of vertical wound, quite superficial. Wound soon cleaned, and patient left hospital, with wound healed and in good health, August 18, 1897.

Subsequent History.—Remains in perfect health at the present writing.

CASE XI.—Walter H., aged twenty-one years, was admitted November 29, 1897.

Previous History.—Six months ago patient suffered from two moderately severe attacks of dull, steady pain in the right kidney. For past two months has had steady, dull, localized pain in the same region. Gradually getting worse to date. Urine has been at times purulent and bloody. Of late frequency, and pain in anterior urethra. Has lost flesh and has had a febrile movement.

Physical Examination.—Patient appears to be in good general condition. Nothing found in abdomen. Temperature and pulse, normal. Urine, acid; specific gravity, 1020.

Operation, by Dr. McBurney, November 30, 1897. Six-inch cut one-half inch below and parallel to the free border of the ribs, beginning two inches from median line in front. Perirenal fat exposed and kidney inspected and palpated; nothing abnormal found. Suture of the wound. Gauze drainage.

December 10: Wound aseptic and healed. No return of old pain. Left the hospital, well, December 30, 1897.

Subsequent History.—Has remained in good health until October, 1898.

CASE XII.—John F., aged eighteen years, a student, was admitted April 25, 1898.

Present Illness.—Has always suffered from pain in the right side of the abdomen. It is of a steady, boring character; never shooting downward. The pain is worse after exercise, and is occasionally very severe. Vomiting often precedes relief of pain. An attack is occasionally relieved by a sudden change of posture in bed. These paroxysms are brought on by any active exercise, and are less severe if the patient leads a quiet life. The paroxysms occur often and last an hour or two, and sometimes for two days. He has been treated by many men for many things, but without relief. Among other things he has worn a plaster jacket for scoliosis. Three radiographs, taken at different times

to illustrate and demonstrate this deformity, showed an opacity in the region of the kidney.

Physical Examination.—A thin youth with a moderate scoliosis, dorsal concavity to right, lumbar concavity to left. The radiographs show an opacity three-quarters of an inch in diameter in the region of the left kidney; point of tenderness just below the ribs, left side, three inches from the spine. Urine negative.

Operation, April 26, 1898, by Dr. McBurney. Incision three inches long parallel to and one and one-half inches below the ribs, beginning three inches external to the outer border of the left rectus muscle. Exposure of the kidney. By palpation a sense of resistance is felt in the upper and anterior part of the organ. A needle introduced at this part touches a stone. Kidney incised transversely at its middle and upon the anterior and external surface; stone removed with a scoop. It measured one and one-half inches by one inch. It was ovoid in shape, situated in the kidney-substance, external and anterior to the pelvis. Considerable bleeding controlled by packing. Partial suture and packing of the wound.

Wound healing aseptic. May 10: Patient is now well and free from pain. His urine is normal. He left the hospital May 21, 1898.

Subsequent History.—Reports himself, September, 1898, perfectly well in every particular since the operation.

CYSTIC DEGENERATION.

The cases of cystic degeneration of the kidney numbered seven. There were three males and four females. Their average age was thirty-two years. The oldest forty-two; the youngest twenty. Symptoms referable to the kidney had been present on an average of five years. In one case for thirteen years; in one case for two years. In four cases there was a history of repeated typical attacks of renal colic. In one case constant dull pain in the right loin was present, more severe at intervals. In two cases pain was referred to the right iliac fossa. In four cases hæmaturia had occurred. In four cases pyuria was present on admission. In two cases the urine was normal. In three cases

fever was present on admission to the hospital. In five cases an abdominal tumor was felt in the loin. In one case the kidney was freely movable.

Five cases were treated by extraperitoneal nephrectomy. In three cases the incision used was parallel to the ribs. In two cases a modification of König's incision was used, the anterior portion of the cut passing upward and inward instead of following the direction of the iliac crest. Intravenous salt infusion was used after operation in two cases. All these cases of nephrectomy recovered. In four cases healing was aseptic; in one case stitch-abscesses occurred.

The results in these cases were as follows:

Case II remains well, five years after operation.

Case III is now, two years after operation, a patient in the hospital. Her cystitis persisted after operation. She now suffers from suppurative nephritis and pyelitis of the remaining kidney and ureter.

Case V left the hospital well. Her subsequent history could not be obtained.

Case VI is in good health, two years after operation.

Case VII, one year after operation, is in good general health. He has had several slight attacks of hæmaturia since the operation.

In four of these cases the entire kidney had undergone a cystic degeneration. In one case a single cyst was present.

In Case I, a single large cyst of the kidney was drained through the loin. The patient died of uræmia on the eighth day.

In Case IV both kidneys were the seat of cystic degeneration. An exploratory incision was made in the loin. The patient died of acute lobar pneumonia on the sixteenth day. The wound had healed.

CASE I.—Kate K. N., aged forty years, was admitted July 8, 1890.

Previous History.—For the past six years she has suffered with a continuous dull aching pain in the right loin, more severe

at intervals. There is an abnormal tumor in the right lumbar region, dull on percussion; the surface is smooth and elastic; the tumor extends nearly to the median line in front and appears to be the kidney. Urine normal.

Operation, July 9, 1890, by Dr. McBurney. Three-and-a-half-inch oblique lumbar cut, exposing the kidney. A cyst containing two pints of clear fluid evacuated. Cyst walls stitched to skin. Though the wound appeared clean, patient developed fever, passed a diminished quantity of urine containing abundant casts, and died comatose on the eighth day, with high temperature.

CASE II.—John R. T., aged twenty-five years, was admitted January 6, 1893.

Previous History.—Since the age of twelve years he has suffered from repeated attacks of renal colic on the right side, with characteristic symptoms. Recently the attacks have been accompanied by hæmaturia and pyuria. General health good. No fever during the attacks. Urine contained a little pus.

Operation, by Dr. McBurney, January 6, 1893. Five-inch incision below and parallel to the last rib. A large cystic kidney exposed. Cysts of various sizes scattered throughout the surface of the organ. Catgut ligature of pedicle; ureter fixed at the lower angle of the wound.

Wound healing normal. He left the hospital March 22, 1893, with a small sinus.

Subsequent History.—A portion of twelfth rib removed some months later in order to allow cavity to close, after which the wound healed and the patient has remained in good health until September, 1898.

CASE III.—Sophia D., aged twenty years, was admitted January 5, 1896.

Previous History.—Five years ago had an attack of colic with general abdominal pain, not localized, lasting two days. Several similar attacks since. Eight days ago an attack of pain in the right groin, nausea; bowels had not moved in eight days. After medicine bowels moved. Patient felt weak and pain was more severe than before in the right groin, accompanied by fever, vomiting, ardor urinæ. No history of gonorrhœa. Urine said to have been often cloudy.

Physical Examination.—Extreme tenderness in the right

iliac region in front, and in lumbar region behind. Belly soft, but tender over the urinary bladder. Bladder does not contain a stone. Temperature on admission, 104.8° F.; pulse, 148. Urine, cloudy, alkaline; specific gravity, 1014; much pus.

By bimanual examination the lower end of a large, movable, globular mass could be felt in the right lumbar region.

Operation, by Dr. Hartley, January 25, 1896. Incision beginning at the external border of the right rectus, four inches below the ribs, carried with a semilunar curve convex downward to edge of the erector spinæ, and then directly upward to just below the last rib. Kidney exposed without opening the peritoneum. Organ found to be double its normal size and its surface nodular. Separate catgut ligatures were placed upon the ureter, artery, and vein. Kidney removed. Sterile packing of deep wound and partial suture.

Pathological Report.—Kidney was twice its natural size. Its surface was studded with bluish nodules one-quarter to one-half inch in diameter. These were subcortical, and contained a bloody mucoid fluid. Upon section the organ appeared to be entirely degenerated with cystic formations, as above described. Very vascular.

Wound Healing.—February 24: Wound superficial. Urine, specific gravity, 1012; acid; pus and bacteria. Discharged, improved, February 28, 1896.

Subsequent History.—The patient re-entered the hospital in June, 1898. Since the operation has continued to suffer from pyuria and ardor urinæ. Of late she has had severe attacks of pain in the left lumbar region radiating downward. She has almost constant pain in the bladder. Urine of diminished specific gravity, cloudy, acid, albuminous. Contains much pus and granular casts. The attacks of renal colic occur every few hours and are very severe. After the attacks the urine is more purulent.

The left loin is very tender.

October 15: Patient is not markedly emaciated; color fairly good. The left loin is dull on percussion. The dullness extends downward nearly to the iliac fossa and forward as far as the border of the left rectus. Deep palpation is impossible on account of extreme tenderness. The attacks of renal colic occur once or twice daily.

CASE IV.—Hugh G., aged forty-two years, was admitted February 18, 1896.

Previous History.—Alcoholic. Two years ago the patient had a prolonged attack of hæmaturia; six months later another attack, lasting five days; pain in the back during the attack; also headache, nausea, and slight prostration. Third attack began six weeks ago,—hæmaturia and pain.

Physical Examination.—The patient was a pale, feeble individual, with tremor. Complained of pain over right kidney. Temperature, 100.6° F.; pulse, 96. Urine, amber; acid; specific gravity, 1006; albumen in moderate amount; pus and red cells.

Operation, March, 1896, by Dr. McBurney. Four-inch lumbar cut below and parallel to last rib on right side. Kidney exposed, moderately enlarged, six inches in length. Surface of organ covered with small cysts containing yellowish fluid. A small portion of organ removed for examination. Suture of wound; rubber tube drainage. Palpation of the left kidney under ether showed that it is also enlarged.

March 11: The patient developed fever, rapid respiration, and the physical signs of pneumonia of the right lower lobe, and died March 16, 1896.

CASE V.—Agnes G., aged thirty-eight years, was admitted August 25, 1896.

Previous History.—Has complained from time to time of pain in right iliac fossa. Ten days ago pain severe, chill and fever, since then in bed.

Physical Examination.—Nutrition good. Tenderness all over the right side of the abdomen, which is resistant from free border of ribs to right iliac fossa. There is a large, ill-defined mass which seems to extend from beneath the ribs well down to the iliac crest. It was immovable, firm, and moderately tender. Temperature, 99.2° F.; pulse, 85. Urine, specific gravity, 1010; acid; moderate albumen and pus.

Operation, August 28, 1896, by Dr. Hartley. Modified König's cut. Large cystic kidney exposed and enucleated. Artery, vein, and ureter cut between double ligatures. Middle two and one-half inches of wound packed after removal of kidney. Salt infusion with good result.

Pathological Report.—Kidney, the size of three fists, entirely

composed of cysts, from pea to marble size, little or no normal tissue remains. Cysts contain turbid fluid.

Wound Healing.—Deep wound aseptic; stitch abscesses. Left hospital, well, October 24, 1896.

Subsequent History.—Not known.

CASE VI.—Bertha S., aged thirty-three years, was admitted January 8, 1897.

Previous History.—Six years ago began to have paroxysms of severe pain, coming on suddenly and located in right lumbar and umbilical regions. These attacks lasted from three to four days, during which time patient was confined to bed. She had a chill, nausea, vomiting, and marked abdominal distention. She has noticed for some time the presence of a movable tumor in the abdomen, usually at the level of the umbilicus.

Physical Examination.—Palpation reveals a mass, four by one and one-half inches, lying in right umbilical and iliac regions, its long diameter being vertical. The tumor was somewhat movable, not tender on pressure, of firm consistence. Gurgles on manipulation. Does not resemble kidney in shape. Percussion in right lumbar region dull.

Operation, January 9, 1897, by Dr. McBurney. Five-inch cut, beginning two and one-half inches from spine, passing outward parallel to ribs and below them. Kidney exposed and pushed into wound. The organ is freely movable. Its capsule was incised for two inches and stripped from surface a short distance. Catgut sutures of capsule to muscular wall of wound. Partial suture of the wound—packing. Before suturing kidney to abdominal wall a moderately large cyst was discovered on its posterior and lower aspect, the contained fluid of which was clear straw colored.

Wound healing aseptic. Urine remained normal. But the cyst continued to discharge considerable bloody and serous fluid. This continued until April 16, 1897, when the opening into the cyst was enlarged by incision, and two large drainage-tubes were introduced into the cavity. After this the condition remained the same until June 4, 1897, when nephrectomy was done by an extraperitoneal incision, including the scar. Ligation of vessels with catgut. Ureter cut, cauterized, tied and reburied. Suture of wound, outer two-thirds, remainder packed. Intravenous salt infusion on account of moderate shock; good

result. Patient passed a sufficient quantity of urine on the days following the operation. Although the wound remained clean in appearance there was a good deal of bloody discharge, and a moderate febrile movement. The patient's stomach did not retain food well for a time, and she was fed by rectum. After a time there were several small foci of suppuration, which developed in the superficial part of the wound. The wound did not heal until July 22, 1897, when the patient left the hospital well.

Subsequent History.—In good health two years after operation.

CASE VII.—Anthony M., aged twenty-seven years, was admitted October 21, 1897.

Present Illness.—During the past four years he has had attacks of left lumbar pain at irregular intervals; of late more often and more severe; at present is incapacitated for work. During past two years occasional attacks of hæmaturia.

Physical Examination.—A pale, fairly nourished man; chest and abdomen negative. Urine presents calcium oxalate crystals and a few red cells; for the rest, normal.

Operation, by Dr. McBurney, December 10, 1897. Extraperitoneal nephrectomy. Four-and-a-half-inch oblique lumbar incision in the left loin. Exposure of kidney, which is enlarged, high placed, and consists of a mass of cysts. Vein and artery ligated with catgut; ureter cut, cauterized, and tied with catgut; partial suture and packing of the wound.

Wound healing aseptic. January 28, 1898: Wound healed; patient well. Urine, specific gravity, 1022; acid; a few red blood-cells; calcium oxalate crystals.

Subsequent History.—September, 1898, has remained in good general health, but during six months following operation had a number of attacks of hæmaturia, some of them quite severe. Recently he has passed bloody urine occasionally. At times he passed a diminished amount of urine, and suffers from a dragging pain in left loin. He is relieved when the quantity becomes normal. He has gained sixteen pounds in weight since operation, and now weighs 186 pounds. Normal frequency; urine clear.

(TO BE CONCLUDED.)

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 29, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

OSTEOPLASTIC EXCISION OF THE WRIST-JOINT.

DR. FREDERICK LANGE presented a man, thirty-nine years old, who, until the onset of his present trouble, had always enjoyed good health. On the 29th of May, 1893, he was admitted for a large swelling of the lower end of the left radius; this was operated on, and he was discharged, four months later, with a discharging sinus. In October, 1893, and in February of the following year, he was again operated on for recurrence of the growth.

In May, 1894, when the patient first came under Dr. Lange's care, he presented a fungoid growth, surrounded by scar-tissue, evidently taking its origin from the lower third of the radius, which was thickened and partially destroyed. After an extensive excision of the bone, almost four inches in extent, the patient made a rapid recovery, and two months later he was able to resume his work. In January, 1897, he again presented himself with a recurrence of the growth, which now involved almost the entire carpus, with the exception of the os pisiform and os unci-form. The hand was useless for work, and a number of the axillary glands were distinctly swollen.

On February 11, 1897, the carpus was excised, together with the bases of the second, third, and fourth metacarpal bones, and a number of enlarged glands were removed from the axilla. In order to secure for the ulna a broad attachment to the hand the following plastic operation was done: About one inch above the styloid process the ulna was sawed across within its periosteum; the proximal end of the bone was then displaced out of the peri-

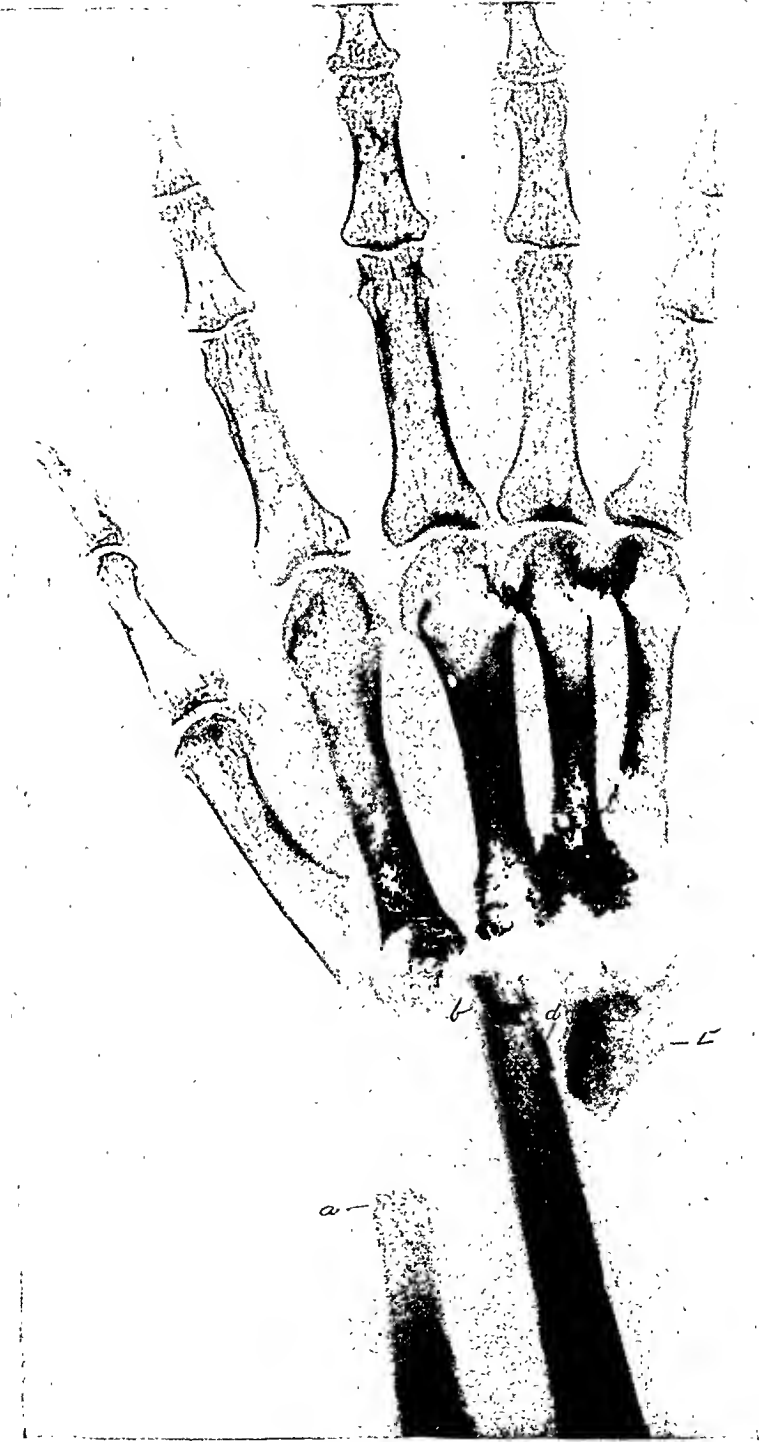


FIG. 1.—Osteoplastic resection of the carpus three months after operation ; *a*, radius ; *b*, proximal end of ulna, displaced and united to second and third metacarpus ; *c*, distal end of ulna ; *d*, periosteum in beginning ossification ; between *c* and *d*, the point of a broken drill ; *e*, probably point of needle.



FIG. 2.—Osteoplastic resection of carpus twenty months after operation; broad, firm, long bridge between the two ends of the ulna; the proximal end of the latter now more opposite to the third metacarpal bone.

osteal cylinder anteriorly, pushed down to the sawed ends of the second and third metacarpal bones, and united to them by silk-worm sutures; the empty periosteum connected the two ends of the severed ulnar bone. The extensor tendons, now much too long, were suspended in several loose catgut loops, drawn through the integument, and tied outside, thus preventing the tendons from lying in close approximation to the bone and becoming adherent to it. Cicatrization was completed in about three weeks. The tendons, aided by proper exercise and electricity, gradually resumed their function, and within three months after the operation the hand was again fairly useful. The man is a locksmith and machinist, and is now able to perform all the work belonging to his calling. The hand is slightly adducted, but he has good control over it; there is no wabbling and the metacarpal bones are closely approximated to the carpus.

In connection with this case, Dr. Lange showed two Röntgen-ray photographs, taken, respectively, four months and twenty months after the operation. One of these photographs shows the formation of a broad and firm bony bridge between the two parts of the ulna, which now forms the ulna-metacarpal joint; in the first photograph, which was taken about four months after the operation, it appeared as only a slight shadow. A broken point of the drill is seen in the distal end of the ulna in both photographs. The relation between the second and third metacarpal bones and the ulna has somewhat changed, the latter being in closer approximation to the base of the third metacarpus. (See figures.)

LYMPHANGIOMA CAVERNOSUM OF THE FACE.

DR. LANGE presented a boy, thirteen years old, in whose left cheek, when he was six weeks of age, a small swelling, about the size of a bean, soft and painless, was first noticed. After his eighth year the growth began to increase quickly in size: this the mother attributed to a slap on the cheek which the boy had received from one of his schoolmates. About that time the growth was ineffectually treated by electricity; it was also punctured and a bloody fluid evacuated. It soon, however, returned to its former size.

Three years ago the patient came under Dr. Lange's observation. He presented a swelling over his left cheek, between the

zygomatic arch and the ear, and extending downward almost to the angle of the jaw. Anteriorly it extended to about one inch from the angle of the mouth. It was soft, elastic, and somewhat compressible; it was not sharply limited, and its surface had a bluish tint, from the presence of dilated veins. The tumor seemed to be intimately connected with the parotid gland. Puncture revealed a dark, bloody fluid, apparently of long standing. In view of the fact that the tumor had recently increased in size very slowly, if at all, no operation was advised at the time, especially as any attempt to remove the growth would almost certainly have involved the facial nerve, with consequent paralysis.

Two years later, when the patient was again brought to Dr. Lange, no material change had occurred. Recently, however, it began to increase rapidly in size, and an operation for its removal was undertaken on September 29, 1898. After preliminary ligation of both external carotid arteries the tumor was excised, the incision being carried from the posterior third of the zygomatic arch almost to the angle of the mouth. The swelling consisted of a sponge-like tissue, containing numerous cysts, with very thin walls, and filled with a lymphoid fluid. The growth was not sharply defined, and from it a long process extended into the parotid in the direction of the angle of the jaw. Anteriorly, the muscles of the face seemed partly replaced by it, and a small portion of the zygomaticus major had to be removed.

Owing to the preliminary ligation of the external carotids there was no difficulty in dissecting out the more important branches of the facial nerve and Steno's duct. The nerves supplying the lower outer part of the orbicularis oculi, however, were cut across, which has produced almost complete paralysis of the lower eyelid. The muscles of the mouth are apparently intact, excepting when excessive movements of the mouth are attempted; then the action of the muscles is slightly sluggish, as compared with those of the opposite side. There is practically no disfiguration of the face.

Dr. Lange said he had resorted to preliminary ligation of both external carotids in several cases of large vascular tumors of the face and skull, with very good success. In one case, however, that of a small child, where the operation had been well borne and the patient was intrusted to the care of the parents, death occurred from secondary oozing within twenty-four hours

after the operation. The operation was done for the removal of a telangiectatic tumor of the face and neck, of enormous size. It seemed that the parents purposely did not give notice of the bleeding.

DR. ROBERT H. M. DAWBARN said that *apropos* of malignant tumors, fed by the external carotids, he wished to call attention once more to a plan of treatment which he first reported in the ANNALS OF SURGERY about a year ago. The method consists of not merely tying the external carotids, but excising them from end to end. The objection to simple ligation of the artery is that in the majority of instances it affords only temporary relief, which is not surprising when we bear in mind the fact that the circulation of the external carotid can be re-established in a great number of different ways. This possibility is greatly lessened by cutting out the artery from end to end, thus permanently starving the new growth.

Dr. Dawbarn said he had resorted to excision of the external carotid on both sides in five cases, and on one side in one case. Dr. Da Costa, of Philadelphia, has since done it twice upon one patient. The double operation cannot be done at one sitting, as it is too grave an operation; and yet no patient had died from these eleven excisions. In one case of sarcoma of the nasopharynx, in which this expedient was resorted to some three years ago (a patient of Dr. Lederman, of this city), it resulted in a marked and permanent shrinkage of the growth. The patient is still alive and well. In two other more recent instances the patients have lived long enough after the operation to render the cases of some little value from a statistical stand-point, and as yet no recurrence has taken place. In the few remaining cases the patients died very shortly after the operation from the disease for which the operation was done (carcinoma very far advanced at the time of operation). The method is well worth considering as, perhaps, offering hope to the otherwise hopeless.

A REPORT OF THE SURGERY OF THE KIDNEY,
DONE IN THE ROOSEVELT HOSPITAL, NEW
YORK CITY, FROM JANUARY 1, 1890,
TO OCTOBER 1, 1898.

DR. ALEXANDER B. JOHNSON read a paper with this title, for which see pages 10 and 218.

DR. FRANK HARTLEY said he was particularly interested in one point brought up in Dr. Johnson's paper,—*i.e.*, the difficulty of diagnosing between renal calculus and the presence of small tubercular foci in the kidney. Another difficulty often encountered is to determine the condition of the opposite kidney; acute suppression after an operation on the kidney for tuberculosis is probably frequently due to the fact that the opposite organ is also diseased.

The most advantageous method of gaining access to the kidney—whether by the extra- or intraperitoneal route—depends somewhat on the conditions we have to meet. In cases where we have to deal with pus and firm adhesions, it is better to resort to the extraperitoneal operation, especially if the patient is run down; by this method there is no danger of pus entering the peritoneal cavity. By adopting the König or the modified König incision, the surgeon can enter the peritoneum and at the same time do a perfectly extraperitoneal operation. The dangers of the two routes are about equal.

DR. ROBERT ABBE said he agreed with Dr. Hartley that it was often very difficult to distinguish between pain of small renal calculi and tuberculosis of the kidney. The most aggravated renal symptoms are often due to the presence of a very small stone or to crystalline masses in the kidney. In one case, where the pain and hæmorrhage were very severe, the speaker succeeded in finding only small crystal bits attached to the summit of one pyramid in the renal pelvis. This he curetted away, sewed up the kidney, and obtained immediate cure. In two cases of nephralgia stones were located by the aid of the Röntgen rays: They were so small that they would have escaped detection by the ordinary methods of examination had it not been for the X-ray picture, which beforehand showed its location. Even after the kidneys were opened, it required prolonged search with the probe to find them.

In cases of tuberculosis of the kidney, a question arises whether it is better to remove the organ early or incise and drain. If the diagnosis is positive, it is preferable to remove the diseased organ as soon as possible; but if the case is simply one of pyonephrosis,—not necessarily tubercular,—it is worth while to try the benefit of drainage, prolonging it for months or even a year or two. In such cases the suppurative process not infrequently

subsides, and a healthy portion of kidney may be left. In some instances tubercular foci may remain encapsulated for long periods of time. In one such of Dr. Abbe's cases the patient had been operated on for a pyonephrosis nine years previous to the time when he came under his observation: during that period he had maintained fair health, but finally the kidney had to be removed; and, on examination, it was found to contain tubercle bacilli. The probabilities were that it had been tuberculous from the start, but that the bacilli had remained quiescent.

DR. GEORGE WOOLSEY said he had met with cases similar to those referred to by Dr. Johnson, where the existence of renal symptoms, colic, etc., could not be accounted for. In one case, where the patient complained of violent attacks of renal colic, no stone could be discovered in either the kidney or ureter. The only abnormality discoverable was that the organ was slightly displaced and movable: this was corrected and the patient has since been free from all renal symptoms.

Dr. Woolsey said he agreed with Dr. Abbe that, in cases of pyonephrosis, long-continued drainage will sometimes effect a cure. In two cases of advanced tuberculosis of the kidney, in which he resorted to nephrectomy, the urine had given no indication of renal trouble.

DR. JOHNSON, in closing, said that in performing nephrectomy for tuberculosis the question always arises whether the corresponding ureter should also be removed: it seemed entirely rational that this should be done, as in many instances the ureter is undoubtedly tuberculous, and prevents the complete recovery of the patient. In one such case coming under the speaker's observation, where a tuberculous ureter was left behind, the patient's urine is still continually loaded with tubercle bacilli. On the other hand, the ureter cannot be safely removed in every instance at the time of the nephrectomy; in such cases it might be taken out later, perhaps in a month or so, when the patient has recovered from the effects of the previous operation.

FOREIGN BODY IN THE APPENDIX.

DR. DAWBARN showed an appendix which was perforated by a pin. The specimen was removed from a child twenty months old, who in August, 1898, was seized with an attack of appendicitis, which resulted fatally. The appendix was found at opera-

tion perforated by a pin, which the father asserts the child had swallowed five weeks previously. The pin, which was an ordinary white one, has assumed that smooth, black tarnish which metal long retained in the body acquires so often. It now closely resembles a black pin.

The patient was one of Dr. Oakes, of Williamsbridge, this city. There was a little doubt as to diagnosis, but a little chloroform relaxed the rigid abdomen, and made perfectly evident the presence of a lump at the site of the appendix.

A NEW METHOD OF PRESERVING NEEDLES.

DR. DAWBARN recommended the use of a saturated solution of washing soda in water, for the purpose of preserving surgical needles. He stated that in his opinion this method of keeping the needles and cutting instruments untarnished was superior to any other which had thus far come within his experience. He showed needles kept bright in this way for a year and more. Most of the other methods are open to some objection. Perhaps the most common is to sew the needles into an oiled cloth, but even this does not always prevent flecks of rust. As to keeping them in carbolized oil, this to some extent dulls the edge of the needles just as carbolic acid in watery solution does that of scalpels; lysol being a dark solution, the needles are not very easily seen in it; calcium chloride, in a closed place to keep the air dry, with the needles lying on a dish near it, produces a curious tarnish, almost like rust; in Fuller's earth or other powders it is difficult to find the smaller needles; in alcohol, unless it is absolute (and absolute alcohol ceases to be absolute very soon), the needles will finally rust. A solution of borax in water, as recommended by M. Marchal, will also rust the needles as soon as the thin plating, which all needles have at first, becomes worn away from usage, exposing the steel beneath. Perhaps keeping needles in albolene is almost as good a way as that under discussion; its only objection being the unpleasant oiliness. Calcium chloride in absolute alcohol—thus keeping it absolute—is effective, but comparatively expensive. The same is true of placing a sheet of gelatin in the absolute alcohol, the gelatin by its affinity for water keeping the alcohol absolute.

The method advocated herein—washing soda saturated in water—is without expense, and has been proven to be reliable.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, October 3, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

PLACE OF NEEDLE-HOLDERS IN OPERATIONS.

DR. OSCAR H. ALLIS read a paper on the above-named subject, for which see page 162.

DR. J. C. DA COSTA presented a needle-holder the motion of whose blades was parallel, and the grip of which was very firm, being secured by a "knee-joint" lever mechanism.

DR. DEEVER said that he worked with his fingers and hand more than with a needle-holder, and only used it when forced to do so. Personally he had found nothing more satisfactory as a needle-holder than the hæmostatic forceps. In the mouth and in operations on the cleft palate they are useful. In intestinal work, where one is able to bring the parts to be sutured to the surface of the wound, the finger answers every purpose.

DR. HARTE said that in the Pennsylvania Hospital there was almost a museum of needle-holders which represented a great deal of money and ingenuity. Personally he used a needle-holder only in cavities. He could do three times as much with the finger and thumb as with a needle-holder, except in cavities such as the pelvis, vagina, or in the mouth.

DR. ROBERTS asked whether any of the Fellows were in the habit of using a thimble for suturing; he generally used the Glover needle slightly modified in shape, and recently he has been using the thimble with considerable satisfaction, when the skin is very tough or the tissues rather rigid. The thimble is the tailor's thimble, worn on the third or fourth finger; the tip of the finger sticks through.

DR. HARTE remarked that the great trouble with surgical

needles is simply that their surfaces are made too smooth, and, as a result, they are imperfect. A harness-needle, costing fifteen cents a package, is the same as that sold at an instrument store for seventy-five cents, save that it is spoiled by being put upon a stone and polished until it is as smooth as a common needle. The needle, as received from the manufacturer, has a rough edge; this is easily felt by passing a finger over it. This needle will pass through tissue with perfect ease; but the same needle, polished upon a hone or revolving wheel, is introduced with considerable difficulty through the tissues. If one buys cheap needles one can throw them away, and that is the end of them. Needles are difficult to clean, and so, unless great care is used, the suturing material is infected; but if one throws the needle away after use, there will be no liability of infection.

DR. ALLIS rejoined that every one of the speakers said where the work was simply on the surface they did not want anything better than the fingers to manage a needle. He wished to emphasize the fact that those who only use the needle-holder in difficult places do not become masters of it. If they would use it in every place they would attain great dexterity in its use. Needles are blamed for breaking when, in fact, they have not been properly handled.

DR. MEARS said that in work on the mouth he had struggled for a long time with all kinds of needles and needle-holders, and finally adopted a long-handled needle, with a shank, to which could be attached needles of different curves. He finds that with this needle he can accomplish his work in the mouth better than with any needle-holder which he has yet used.

INTESTINAL OBSTRUCTION; RELIEF BY OPERATION.

DR. WM. J. TAYLOR reported a case of intestinal obstruction caused by a band of omentum. This was relieved by operation, and two years afterwards a second obstruction occurred, which was produced by a loop of small intestine becoming caught beneath adhesions which had formed between two coils of the bowel, evidently the result of inflammatory conditions found at the time of the first operation. Complete recovery from both operations. The history was as follows: The patient, a woman, aged forty years, was admitted to St. Agnes's Hospital on February 11, 1896.

She was the mother of eight children, five of them are living. She had never been sick until two years before, when she had milk-leg following the birth of a child, and since then she has had some uterine disturbance.

On the 5th of February she was attacked suddenly with pain in the abdomen. There was vomiting and nausea, the bowels, which had been constipated, were moved by large enemata, but the pain was not relieved. On the evening of the 11th there was great abdominal distention and pain, and there had been no movement of the bowels for five days. Her general condition was very good, and it was decided to wait until the following morning before operating, and to see whether high rectal injections would not relieve her. There was up to that time no persistent vomiting, and it was not fecal. By the next morning her condition was much more serious; the bowels had not moved, nor had any gas passed, and coils of intestine could be distinctly seen through the abdominal wall, which was very thin. When the abdomen was opened in the middle line the intestines were found to be enormously distended. They were very much congested, being dark in color, and in several places the peritoneal coat was torn. Careful search was made for the cause of the obstruction, which was found to be a long, narrow band from the omentum, completely encircling the small intestine about eight to ten inches from the ileo-cæcal valve, and which passed through an opening in the mesentery, and was then made fast. The intestine was, therefore, completely encircled, as with a string, and the obstruction was complete.

This was not a very recent condition of affairs, as there were quite a number of old adhesions, and the band must have been in position a long time, thus narrowing the calibre of the intestine. The constricting band was cut away, the adhesions broken up, and the intestine above, being enormously distended, was drawn well outside of the abdomen, packed around with gauze and towels, and an incision about two inches in length made in the wall of the gut, when a large amount of fluid fecal matter was evacuated. The wound in the intestine was closed by a Cushing right-angled suture, and over this a continuous suture of silk; a drainage-tube was introduced well down in the cul-de-sac, and the abdominal wound closed. Reaction was slow, but she made a complete recovery, and, with the exception of two

small stitch-abscesses, her convalescence was absolutely uneventful. She was discharged from the hospital, perfectly well, on the 9th day of March, 1896.

On March 15, 1898, a little over two years later, she was suddenly taken with pain and vomiting and general abdominal distress. Matters continued to grow worse, and she was taken to the hospital on March 16, 1898; all her symptoms continuing, although there had been two stools, and, she asserted, wind had passed from the bowels, Dr. Taylor opened the abdomen again at the site of the old operation. The intestines were matted together by very dense adhesions, and at one point two coils of small intestine had been glued together by quite a firm adhesive band. Through the space made by the adhesions of these two coils of gut a large part of the small intestine had passed, and was constricted to such an extent that they were very dark in color, that portion above the constriction enormously distended, and directly at the point of the constriction the intestine which came in contact with the band was almost on the point of rupture. The adhesion was cut, the intestines liberated, and there was the greatest difficulty in separating the intestines from each other. This was eventually done, but at one point the wall of the intestine was torn clear through, while at two other points the outer coat alone was torn. All of these were closed with small silk sutures. The abdominal cavity was then thoroughly flushed with a hot salt solution, and about a quart allowed to remain in the abdominal cavity. The wound was then closed, iodoform dressings applied, and she was placed in bed, the foot of which was elevated after the manner suggested by Clark. Her recovery was absolutely uneventful.

The special points of interest in the report of this case are, first, the mode of constriction, which was an omental band, passing through a small congenital opening in the mesentery, and which was there, apparently, for no other purpose than to cause mischief; second, the slow onset of the intestinal obstruction; it was five days after the beginning of her symptoms before she was operated upon, and, from the appearance of the intestine, certainly four days after the obstruction began; and, third, after making a prompt recovery, she remained perfectly well and comfortable with no symptoms whatever referable to her intestines for two years, but that during that time she had been careful not

to do any heavy house-work. The second obstruction began immediately after she had been washing clothes, the first work of this kind that she had attempted since her recovery from the first operation. It would, therefore, seem that the violent efforts of rubbing the clothes along the washboard had been sufficient to force the coils of intestines under the constricting bands.

In nearly all cases in which he had seen the abdomen opened a second time, after there had been any extensive inflammatory conditions involving the peritoneal coatings of the bowel, he had been astonished at the large number of adhesions and at the gluing together of the intestines. This can exist for a long time without producing any apparent discomfort to the patient. It therefore seems that surgeons should operate early in all cases of obstruction where a previous abdominal operation has been done, in spite of the fact that the symptoms at the time may not be acute, although progressive.

DR. DEEVER related the facts of a case of intestinal obstruction which had recently come under his observation, in connection with Dr. Forward, of Chester. Last summer he had been asked to see with Dr. Higgate, of West Philadelphia, a young girl who had recently graduated from the High School. She had peritonitis, with regurgitant vomiting, abdomen distended, extremities cold and clammy, pulse 140. Strange to say, she temporarily recovered without operation. He had not been able to make a positive diagnosis of the cause of the condition. She remained apparently well until later in the summer, when, after partaking of an unusually large meal, vomiting and pain with great distention came on. For four days her condition was so critical that it was believed to be useless to attempt any operative procedure. Finally Dr. Forward changed his mind and cut down in the region of the cæcum, and found a band of omentum in which was a separated vermiform appendix constricting a knuckle of small bowel. In addition to this there were a number of adhesions. The small bowel above the seat of obstruction was greatly distended.

DR. BARTON remarked that in many cases the cause of the obstruction is trifling, though the obstruction is complete, so much so that when the abdomen is opened the surgeon may fail to find anything. He recalled the case of a woman with an umbilical hernia and strangulation, on whom he operated probably

fifteen years ago. About eight or nine years afterwards she had well-marked symptoms of obstruction. He found the abdomen very much distended; the patient was lying on her back, pretty rosy, rather jolly, but every few minutes she would interrupt the conversation by expectorating reddish fluid; the bowels had not been opened and no wind had passed for several days. Operation was postponed until the next day. During the evening, while the nurse was scrubbing the abdomen in preparation for the operation, the woman said, "I am all right; it has given way." Wind passed shortly after that, and inside of an hour she had a free action of the bowel, and the next day she was practically well. Evidently in this case there was a most trifling catch, and yet it was most complete, no wind passing at all.

DR. TAYLOR added that he had a rather similar case to that mentioned by Dr. Barton. It was that of a man, who had absolute obstruction for several days, with an enormously distended abdomen. No wind passed; in fact, nothing passed the bowels. He had been in the hospital but a short time and, therefore, there had been no preparation made on the belly. While his abdomen was being scrubbed, after he was under ether, suddenly the thing gave way, and he had an enormous stool with a tremendous explosion of wind. He made a perfect and prompt recovery.

OSTEITIS OF THE TIBIA.

DR. J. EWING MEARS said that at the meeting of the Academy, in March of this year, he exhibited two skiagraphs of the right and left legs of a patient, who had recently come under his care, suffering with swelling of the lower end of the right tibia; and suffering pain, more intense at certain times, and especially during the night. The man had sustained, some five or six years previously, an injury to the lower end of the right tibia in jumping over a picket-fence, at which time the right foot was caught, the ankle-joint severely wrenched, and the inner surface of the lower end of the right tibia somewhat contused. He did not at that time apply for medical treatment, and at the expiration of a few days' rest began to use the limb in locomotion. A few weeks subsequently swelling, accompanied by pain, appeared, and these conditions had persisted, in varying intensity, since that time. He consulted medical advice and various methods of treatment were instituted under the different diagnoses which were

made. Counter-irritation, internal remedies, mineral baths, change of climate, and, finally, under one diagnosis, of rupture of the internal lateral ligament, a mechanical appliance was placed upon the leg and worn for a period of nearly a year. When the patient came under the care of Dr. Mears, in February of this year, he was using crutches in locomotion, was taking anodynes to relieve pain, and his general health was very much deteriorated. Dr. Mears cut down upon the bone, making a groove two inches in length, extending from the origin of the internal lateral ligament upward, one-half inch in width and to the depth of one-half inch, with the chisel. Efforts were made with a strong drill to penetrate the cavity which was believed to exist, and at the upper end of the groove the bone was somewhat softened, but the drill, without using too much force, could not be made to penetrate. Under this condition, he contented himself with the attempt which had been made, and closed the wound. For a period of a week the pain was very much reduced and sometimes absent. After this time, however, the swelling, which had been abated, began to increase, heat and redness presented themselves as symptoms, and on reopening the wound, the point at which the softened bone was found in the previous operation, was in such condition that it was easily penetrated and pus freely escaped. The opening was enlarged, the cavity was thoroughly curetted with the spoon, and packed with 5-per-cent. iodoform gauze, the ends of the packing being brought out through the wound, and in this way drainage accomplished. This packing was renewed on the third day, and subsequently on the second day, a less quantity being used on each occasion, until the abscess cavity became obliterated and the soft tissues closed. The swelling decreased to such an extent that, when the patient passed from under the treatment, the circumference of the two legs at the point above the ankle was the same. The patient, as he continued to improve, discarded as soon as the wound healed the use of the crutches, and for a short period used a cane in walking.

The history of this case and the difficulties which presented themselves in the case, so far as related to the diagnosis, were characteristic. While the more marked symptoms of osteitis are easily recognized and the physical conditions assist materially in making the diagnosis, it is very often difficult to decide the question as to the presence of an abscess-cavity in the interior of the

bone. The symptoms which indicate the presence of pus were frequently well marked in this case as deterioration of the general health, variations in temperature, pain of a boring or gnawing character, especially severe at night, with little or no discoloration of the surface. He used the chisel in this case in preference to the trephine, as he believed that in its use he should be able more certainly to reach the point of entrance into the cavity. The case further illustrates the necessity in these cases of making repeated efforts to penetrate the cavity; the fact that pus is not found in a first operation not being evidence of its non-existence. In this case the amount of hypertrophied bone tissue decreased sufficiently the resistance so as to permit the pus to declare its presence in more marked manner.

Stated Meeting, November 7, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

EXCISION OF THE ASTRAGALUS FOR THE RELIEF OF TALIPES EQUINO-VARUS.

DR. WILLIAM BARTON HOPKINS exhibited for Dr. Morton, who was unavoidably absent, the following cases:

The first child, Albert B., aged eighteen months, was admitted to the Orthopædic Hospital on April 19, 1898, with double equino-varus, the deformity being very marked, with displacement of the astragalus forward. On May 12, after division of the flexor tendons of all of the toes, and also the tendo Achillis, the astragalus was excised. The usual incision was made from near the base of the fourth toe across in a straight line to the external malleolus; the astragalus was found in advance of the tibia; both feet were similarly treated. The incisions were closed with a few sutures, ample space being left for drainage, usual dressings were applied, and the feet placed at right angles in splints, with large openings at the angles of the splints, so that no pressure should be made on the heel. The wounds healed by primary union. Perfect result followed, with good ankle motion.

The second case, Morris H., aged twenty-four months, was admitted October 7, 1898, with talipes equino-varus of the right

foot. The operation similar to that already described was performed on October 10, the result being in every way satisfactory.

The third case, I. C. W., aged forty-three years, was admitted March 13, 1897, with congenital talipes equino-varus and excessive deformity, having for years walked on the upper surface of the foot. The operation was performed March 23; after the division of the flexor toe tendons, tendo Achillis, and plantar fascia, the usual incision was made, the peronei tendons being drawn aside, the astragalus and cuboid bones were excised, and a part of the scaphoid; in fact, all bony parts which interfered with rectification of normal position were removed. Patient was discharged, with a useful straight foot, and good ankle-motion, May 18, 1897.

DR. DE FOREST WILLARD said that the term inveterate talipes varus was hardly applicable to a child of two years of age, as was one of these children at the time of operation, while the other one was even younger. In adults the removal of the tarsal bones is often the wisest course, but in young children it did not seem to him that the results obtained are any better than in the average talipes case operated on by multiple tenotomies and forcible straightening. The motion at the ankle-joint is not as good, and the removal of the cuboid, in addition to the astragalus, certainly interferes very seriously with the length and with the elasticity of the foot in later life, which is one of the important elements in the cure of any case of club-foot. It is not simply getting the foot straight, but the giving of elasticity to the step; which is so important; in young children, in the majority of cases, this can be done. In adults it is obviously, impossible, after a person has walked for thirty or forty years upon his deformed feet and the bones are thoroughly misshapen and wedge-shaped, that one could ever again obtain the proper appearance or elasticity, and the surgeon must be satisfied with a more or less rigid foot that can be planted fully and squarely on the sole. Even a considerable amount of rigidity is allowable in such cases, because a man can walk with a foot that is stiff. The question of expense in procuring an apparatus is also an important one, as is also the question of pain from corns, excoriations, and excrescences, so that the operation becomes a very valuable one in these adults. In young children under one year of age, in the majority of cases,—certainly 80 or 90 per cent.,—the operation

which permits all the bones to remain in place, at the same time straightening the foot, gives in the end a better walking result. Not every case can be treated in the same way; in fact, almost every case requires a different method and must be studied individually. Some cases do better with tenotomies, others with open section, others with the removal of the astragalus, but he did not think that the removal of the astragalus and cuboid should be at all a routine operation in young children; on the contrary, it should be employed at this age only in exceptionally rigid cases.

THE IGNORANCE OF SURGEONS REGARDING FRACTURE OF THE LOWER END OF THE RADIUS.

DR. JOHN B. ROBERTS said that in an article on fracture of the base of the radius, published in a New York journal a few months ago, the author, a professor of surgery, stated that skiagraphic investigation showed that these fractures of the radius were frequently associated with transverse fracture of the head of the ulna. The statement would, perhaps, have gained professional acceptance had the author not reproduced the skiagraphs on which his opinion was based, and given the ages of his patients. These details made it evident that the supposed fracture was the skiagraphic picture of the normal unossified epiphyseal cartilage between the shaft and lower end of the ulna.

Some weeks ago he incidentally saw a fracture of the lower end of the radius under the care of a well-known surgical teacher and writer. It was being treated with anodyne lotions and a Bond splint. In Dr. Roberts's opinion the fracture was the usual injury with backward displacement of the lower fragment; it had not been reduced, and it ought to have been immediately subjected to sufficiently great force to drive the upper fragment down into position, even if anæsthesia was necessary for the accomplishment of this essential step. When he stated his opinion, the surgeon in charge, to his profound astonishment, said that he believed the fragments were partially impacted; that the position was pretty good; that he preferred to leave such cases alone, since manipulation, such as was proposed, would probably increase the mobility at the point of fracture; and that a compress over the elevation due to the displacement might perhaps be judicious. The surprise of the speaker at these statements can

scarcely be expressed. That fractures at the base of the radius must be reduced; if deformity, protracted convalescence, prolonged rigidity of joints, and pain are to be avoided, was, he had thought, accepted by every surgeon of the present day. That a compress, applied over the deformity due to impacted and unreduced fragments, was a futile substitute for the muscular force to be exerted on first seeing the injury was, he supposed, recognized by all surgical teachers.

His arguments, supplemented by a diagram giving his idea of the bony conditions present, failed to convince his colleague of the danger of inaction; and, as he had no professional connection with the case, he retired from the room before the splint was reapplied to the unreduced fracture.

These two instances are sufficient evidence that much that has been learned regarding the anatomy, pathology, and surgical therapeutics of radial fractures during the last ten or fifteen years needs constant reiteration in journals, societies, and classrooms. Ignorance of scientific progress in fields somewhat different from those in which men are working may lead them to incorrect conclusions; or the want of time during the busy days of professional life may prevent them paying sufficient attention to the progressive developments of clinical and experimental observation.

It has been his experience to be obliged to set many fractures of the lower end of the radius, which had previously been put up in splints without reduction of the displacement. This oversight he has found very prevalent among general practitioners and resident physicians in hospitals. He has attributed the neglect to reduce the fragments by the former class to the teaching of twenty years ago, when the pathology of the lesion was misunderstood; by the latter to insufficient attention to the instructions of their surgical teachers.

He has learned to never expect to see the fracture completely reduced by resident physicians and general practitioners. Some of them, however, do appreciate the supreme importance of immediate and complete reduction and accomplish it; and in other instances the fracture has been attended with little or no displacement, and the neglect to reduce the fragments is not demonstrable.

He has now come to feel that perhaps the oversight in re-

cent graduates is due to the fact that their teachers do not insist upon the importance of reduction; and that undergraduate students do not see this fracture properly treated in the clinical amphitheatre and class-room.

These reflections had induced him to present for discussion by the Academy of Surgery the present topic; for he knew that much physical suffering would be avoided and the surgical art advanced by having the young graduates, whom the Fellows of this body teach, impressed with the idea that failure to reduce, as soon as possible, a fracture of the base of the radius is an injustice to the patient and an opprobrium of surgery.

In conclusion, he stated his position in regard to this fracture in five propositions, upon which he solicited discussion.

(1) Fracture of the lower end of the radius is one of the most satisfactory of all fractures to treat.

(2) The patient, as a rule, has little discomfort after the first twenty-four hours, except from the disability and the annoyance of the sling and dressing.

(3) Stiffness of the fingers and wrist-joint is seldom present to any marked extent after a week.

(4) Deformity after treatment is usually so slight as to be unnoticeable to the average observer, except in cases where there has been marked comminution of the lower fragment.

(5) These assertions are only justified when the surgeon insists upon forcing the lower fragment into its proper anatomical relation with the upper fragment. This is to be done by the exercise of such a great amount of force as will break up all impaction or entanglement and bring the broken surfaces into accurate coaptation. This sometimes, but not usually, requires general anæsthesia; and may demand that the surgeon bend the broken bone across his knee in order to disentangle the interlocked fragments.

DR. W. B. HOPKINS said that surgeons to out-patient departments of large hospitals had peculiar facilities for familiarizing themselves with the best methods of reduction and treatment of fractures of the lower end of the radius. From his own experience, during fourteen years' attendance at the Out-Patient Department of the Pennsylvania Hospital, where as many as thirty-eight and even forty-two fractures of the lower end of the radius have been treated in one month, the importance of reduc-

tion was so thoroughly recognized that any dressing which had been applied elsewhere was immediately removed and the deformity forcibly corrected. Referring to a paper by himself in the *Philadelphia Polyclinic* of May 15, 1886, he quoted the following paragraph:

"Reduction.—The importance of immediate and as perfect reduction as possible, even if it is necessary to use an anæsthetic for its accomplishment, cannot be over-estimated; and it must be borne in mind that what appears to be slight malposition at first will steadily and surely pronounce itself as the swelling subsides, and when it is too late to reduce it by either sudden or gradual means, an ugly fork-shaped deformity will frequently present itself, if complete reduction has not been performed at the beginning. The fragments can usually be brought into accurate apposition by direct and forcible pressure and counter-pressure with the thumbs and index-fingers, and, once in place, very rarely show any tendency to become disarranged."

Regarding the after-treatment, he believes a state of absolute rest, of not only the forearm and hand but also the fingers, during the period of traumatic inflammation, interrupted only by the surgeon's visit, when every joint is to be gently but fully extended once, pronated and supinated fully once, the fracture meanwhile being properly supported, is a method based upon sound principles, and one which in practice he knew to be satisfactory. With regard to the dressing, it must be borne in mind that the lesion produced by a force sufficient to cause this fracture is not confined to the bone alone; the tendons, their sheaths, blood-vessels, fasciæ, and ligaments are liable to any extent of bruising, stretching, or tearing, and the mere fact that the fragments of the radius have been reduced and usually remain locked in place does not negative giving the wrist at least as much care as if it were sprained. He could hardly understand, therefore, Dr. Roberts's willingness to allow a patient with fracture of the lower end of the radius to go about with no more support or fixation than is given by a broad band of adhesive plaster encircling the wrist. The broad band of adhesive plaster, if applied with sufficient tension to give any support, is liable to cause, during the stage of ascending inflammation, swelling of the distal portion of the extremity, which latter increases the tension, and consequently the constricting effect of the band, with a result which, if uncared for, might be disastrous.

DR. H. R. WHARTON agreed with Dr. Roberts as to the importance of complete reduction in fractures of the lower end of the radius. He disagreed with him, however, as to the ease with which this is accomplished. He thought that in some cases it is almost impossible to get complete reduction even under anæsthesia, the bones interlocking, making complete reduction almost impossible. This is shown in many cases under careful treatment, where, after recovery, very marked evidence of deformity is seen. In spite of the greatest care in treatment, cases do occur in which it is almost impossible for a patient to have much function in the arm for a long time. He had seen cases carefully treated in which the reduction of the deformity apparently had been very carefully practised, and in which there was a great deal of pain and stiffness in the wrist and fingers. In a great many of these cases he thought the fault did not lie in the fact that there is a certain deformity of bone, but that the patient is either of a gouty diathesis, and this injury is the exciting cause of irritation about the seat of injury, or in some cases there is distinct neuritis. In such cases there will be seen glossy fingers and redness of the skin following fracture of the radius, in which a reduction has been so thoroughly accomplished that it is impossible to say there is a distinct deformity. This condition occurs often in women advanced in life. In children a fracture of the radius is more satisfactorily treated; here the injury often consists in a separation of the lower epiphysis. In such cases reduction is accomplished without much difficulty, and the deformity is very slight and the functional result is very good. It is a mistake to attribute all bad results in this fracture to carelessness of the surgeon in reducing the fragments. In spite of the greatest care in reduction, in certain cases, a bad functional result in fracture of the lower end of the radius will follow. He agreed to a certain extent with Dr. Roberts that the treatment of fractures of the radius is generally satisfactory, although some cases may suffer pain and have rigidity of the fingers, but eventually they get good use of the hand.

Then, there is another question, that of pronation and supination. In a great many of these cases pronation and supination are more or less interfered with, in spite of what appears to be complete reduction. The antero-posterior deformity may be reduced, but there may be a lateral displacement of the fracture,

which interferes with pronation and supination. It is the exception when one examines a case of healed fracture of the lower end of the radius that one cannot tell from the appearance of the part that such an injury has occurred. One sees a little adduction of the hand and a little undue prominence of the styloid process of the ulna. This is due possibly to some displacement of bone, but it may be due to natural shortening of bone in union. There is always some slight shortening in the process of repair of bone.

DR. TAYLOR instanced one case under his care, a boy seventeen years of age, with a fracture of the lower end of the radius. He used the fluoroscope and examined it with great care and found the fracture. There was a certain amount of deformity before he reduced it. He again examined it with the fluoroscope and the reduction was seen to be absolutely perfect, both from above downward and laterally. He then placed it on a splint, holding it with great care, and bandaged it to the splint, and then examined it again. He now found that in the interval between the placing it on the splint and applying the bandage there had been a certain amount of displacement. He again took it off, reduced the deformity, and bandaged it again, using more care than before. Now, with the fluoroscope, the reduction was seen to have remained perfect. The result was excellent. This case illustrated the possibility of a recurrence of the deformity no matter how perfect the reduction of the fracture; and since it is manifestly impossible to say what one will recur and what one will not, he therefore much preferred using some form of splint that would keep the hand and arm quiet—the wrist and arm—for a number of days.

DR. JOS. HEARN said that he had never found difficulty in retaining this fracture in position when he got the fragments reduced. The late Dr. Levis called his attention to the ease with which he could reduce them by bending the wrist backward. Once they are in place they stay there, as a rule. Moore, of Rochester, treated his cases by a compress and suspending the patient's arm in a sling, and letting it hang in that position. It had been his experience that when he got them reduced they are very easily retained, so that he never had one to change position. He insisted on the patient taking an anæsthetic in order that he might properly reduce the deformity.

DR. MEARS alluded to the practice of fifty years ago. As is well

known, great interest was taken at that time in the treatment of fractures at the lower end of the radius. It was a matter of great moment to make the diagnosis so as to ascertain whether it was a classical Barton fracture or Colles's or Smith's. The splint which was universally used was that of Bond. He had met with two instances in which the splint was applied without any effort being made at reduction of the fragments. It might be interesting to know whether, in the numerous cases which had come under the care of Dr. Hopkins, in the Pennsylvania Hospital, and under the care of Dr. Roberts, many of them had been the Barton fracture. He had a case some years ago, in St. Mary's Hospital, of this variety of fracture, in a lad some sixteen or seventeen years of age, where, as the result of a fall from the fourth story of a factory, the fragment was displaced four inches above the joint, and was clearly defined in its position.

The question as to the character of the dressings applied in the cases reported is of great importance, and should receive careful attention in the discussion of the subject.

DR. G. G. DAVIS said that Dr. Roberts had submitted four definite propositions. The first was, "Fracture of the lower end of the radius is one of the most satisfactory of all fractures to treat." He thought some people consider that fractures are all more or less unsatisfactory, and he would agree with Dr. Roberts in this first proposition, that it is about as satisfactory as other fractures.

The second proposition was, "The patient, as a rule, has little discomfort after the first twenty-four hours, except from the disability and the annoyance of the sling and dressing." He believed it was exceptional for the discomfort to be limited to a period of twenty-four hours; they have discomfort for a longer period.

Third proposition: "Stiffness of the fingers and wrist-joint is seldom present to any marked extent after a week." That would indicate that in the treatment (he does not state here that union would be complete in a week's time) the other symptoms of fracture, such as stiffness and pain, are absent after a week's time. His experience had been that the stiffness does persist after a week's time. There are certain cases—perhaps a considerable number—in which there is no tendency to deformity, and in which massage can be employed with advantage almost

daily from the first. In such a case there is rapid restoration of flexibility and function; otherwise it takes longer.

Fourth proposition: "Deformity after treatment is usually so slight as to be unnoticeable to the average observer, except in cases where there has been marked comminution of the lower fragment." On this head he thought that the point already made by Dr. Wharton, that the projection of the ulna is usually evident, was well taken. He believed there were few cases where some deformity was not present,—that is to say, a slight antero-posterior deformity or some slight shortening, sufficient to pass the hand slightly towards the radial side.

As to the treatment of the fracture, he would hesitate about allowing any fracture to remain unsupported without something to bridge over the line of fracture, whether there is a tendency of the deformity to recur or not, and in his opinion this could be most neatly done by the single straight splint on the back of the wrist. He also commended the plan of Roser, who used a posterior splint and allowed the hand to hang, the hand hanging down and the splint projecting beyond the wrist, the triangular interval being filled up with a wedge-shaped pad, so that the hand was carried in a flexed position. He had not always found this fracture easily reduced. He remembered very well one case in which it was impacted so hard in a stout man that, in spite of an anæsthetic, and the greatest effort of which he was capable, he was unable to reduce the impaction. There are other cases, however, in which by sharply flexing and adducting the hand, bending it towards the ulnar side and sharply flexing it over the knee, and with a dragging motion one is able to bring the fracture down.

HOT AIR IN JOINT-DISEASES.

DR. H. AUGUSTUS WILSON read a paper with the above title, for which see page 155.

DR. DE FOREST WILLARD said that he had employed this treatment largely during the past year, both in private and hospital practice. His experience is similar to that of Dr. Wilson in fibrous ankyloses, in the plastic exudates following fractures, and in other injuries about the joints. High heat is one of the most helpful agents in producing absorption and in diminishing the resulting stiffness which is so common in adhesions in the ten-

dons, in the sheaths, in the muscles, in the soft parts, or in the bone itself, and in recent sprains and injuries.

In regard to arthritic troubles,—rheumatic and gouty ones,—in the rheumatic individuals, in the majority of cases, this treatment has been satisfactory. In some gouty conditions it has been very comforting and certainly a relief to the individual. In regard to tubercular joints, he had been very cautious in reference to its employment. Theoretically there is great danger of disseminating tubercular bacilli or ptomaines by the carrying onward of the germs by means of increased circulation. In this way one may do more harm than good.

THREE UNUSUAL COMPLICATIONS OF HERNIA.

DR. J. CHALMERS DA COSTA reported three cases of hernia presenting complications of an unusual sort.

The first case was a man with an extremely large hernia,—an enormous hernia. He was well aware that the trend of surgical opinion is that it is *not justifiable to operate*, as a rule, upon enormous herniæ. In the first place, it is very difficult to reduce such a hernia after incision, the protrusion, in the words of Petit, having sacrificed the right of domicile in the abdomen. In the second place, operations of such a character are dangerous; and, in the third place, such operations are unsatisfactory, the hernia tending to return. Had he been brought in contact with this case and had found that no complications existed, he would not have attempted operation. When this man was brought into the Jefferson Hospital, a year ago last May, the hernia was obviously in a condition of either beginning strangulation or incarceration. The patient was forty-nine years of age, a hat-blocker by trade, and his occupation required him to work with considerable force a lever which moved some machinery. He first noticed this hernia when he was fifteen years of age, and it had grown of recent years with a great deal of rapidity. He suffered chiefly from its excessive weight; he could not wear any arrangement to hold it up, and his work was interfered with. Three days before admission pain began in the hernia and there was a very great amount of pain in it. The pain was in the mass and was associated with colicky pain throughout the abdomen. There had been absolute constipation for several days; there was nausea, but no vomiting, and the hernia was very tender to the

touch. Upon opening the sac, it was found to contain the appendix, the cæcum, most of the ascending colon, considerable of the ileum, and an enormous mass of omentum. A portion of the ileum was found deeply congested and strangulated; it was twisted and firmly adherent to surrounding structures. The great bowel lay to the outside and to the posterior portion of the sac. It was a question whether the sac was complete at this portion or not. The adhesions were separated, hot saline fluid was applied to the bowel, and the natural color returned. A great mass of omentum was removed, and it was found to reach from the tip of the operator's fingers to the elbow when spread out. An attempt was made to return this hernia into the belly, and it was found to be most difficult to accomplish. In fact, it was effected by main strength. The surgeons and assistants stood upon stools, and, with what appeared to be an almost ferocious attack upon the hernia, succeeded in restoring it to the abdominal cavity. The peritoneum was sutured, as in a laparotomy wound, and a sort of Bassini operation was made, necessarily of a very crude description, because of the atrophied condition of the tissues. The patient made a satisfactory recovery. At present, one and a half years after operation, there is a slight relapse of the hernia, but not a large one, and it is readily manageable by a truss. Since this operation he has developed an umbilical hernia, but not of a large size. At the present time the umbilical hernia is not larger than a walnut, but is growing, and has ample prospects for the future. A truss has been placed over the umbilical hernia, and a truss over the inguinal hernia, and both protrusions are kept satisfactorily reduced.

The second case was a young man, twenty-two years old, who came into the service of Professor W. W. Keen at the Jefferson Hospital, and was turned over to him for the purpose of performing an operation. The man had had a marked inguinal hernia of the left side for a number of years; but it never gave trouble and he never wore a truss. Some thirty-six hours before admission it became strangulated; he was attended by a physician, who placed an ice-bag on it, administering morphine, and made several attempts at taxis. These attempts were futile. The patient was brought into the hospital. There was a considerable amount of tympanites, and he occasionally vomited a greenish fluid, which was not stercoraceous. There was pain and tender-

ness in the hernial mass, and absolute absence of impulse on cough. To reach the constriction and cut it the long incision was made. This permits of a thorough inspection of the parts and renders easy a subsequent radical cure, and its merits have been pointed out by Mr. Lockwood. The sac was opened and the constriction cut at the internal ring. A small portion of the small bowel was in the sac, it was in good condition, and was restored. It was decided to do a Halsted operation. On lifting up the cord for the purpose of removing the accessory veins, which were large, it was noticed that there was a blood-clot running for a long distance along the accessory veins of the cord. Ligatures were applied above and below, and the portion of vein was cut away, when it was discovered that the clot was purulent. Cultures were at once taken, and it was shown by subsequent studies in the laboratory that there was present the staphylococcus pyogenes albus. A radical cure was made, but it was considered expedient to pull the stumps of the veins into the wound and anchor them there, after disinfection with pure carbolic acid. There were no complications, but a few days after the operation it was discovered that the patient labored under a chronic urethral discharge. Cultures were taken and gonococci were found present. The problem in this case is, Was the phlebitis, with an infected clot of accessory veins, connected in any way with the existence of the previous gonorrhœal discharge, or was it due entirely to taxis carried out at such a recent period establishing a point of least resistance.

In the third case there was a complication still more unusual. This man was forty-eight years of age, a laborer, who suffered from a prolapse of the mucous membrane of the rectum. He was operated on in the Jefferson Hospital a number of weeks before by the use of a cautery, but the operation had failed to cure the prolapse, and he came again into the hospital for the purpose of having it removed. He had had for a considerable length of time a reducible hernia of the left side. The prolapse was excised and the mucous membrane sutured. He did very well for three days, except that he coughed a great deal. On the evening of the third day, while having a violent attack of coughing, he was seized with pain in the abdomen, and found that the rupture had come down; that it was painful, and that he was unable to reduce it. He called for the resident physician, who made an attempt to reduce it,

but failed. While manipulating the hernia the resident physician was surprised to hear and feel a crackling, when he pressed on the mass, as if air were diffused through the tissues. On reaching the hospital Dr. Da Costa examined into and confirmed this fact. There was distinct crepitation which could be heard and felt. It seemed to be deep within the sac. This crackling could be traced from the left side to the right side, apparently along the course of the colon. The question as to what had happened was doubtful. The first thing thought of was that some stitches which were put in at the operation had given way, and that during the fits of coughing air had been diffused into the subserous tissue. On examining the stitches they were found intact. Inability to reduce the hernia determined operation. An incision was made, the hernia was exposed, the sac was opened, and the hernia was found to be composed of the large bowel, and within the mesocolon was a collection of air which crackled when pressed on; it contained air in what looked like bubbles, opalescent bits like large globules of milk. Dr. Da Costa introduced his hand into the abdomen and was able to discover that the ascending, transverse, and descending mesocolon, and the mesorectum were in the same condition. In fact, the distention was so great downward towards the pelvis that it was difficult to pass the hand. The wound was closed, and again examined. Upon examination of the rectum there was found above the lines of stitches an ulceration which had apparently followed the cauterization, and when the bowel was pressed upon air escaped from the ulcer in distinct bubbles. A tube was introduced into this opening and carried into the subserous tissue, and in the course of four or five days this very large collection of emphysematous material passed away and the individual recovered. It is very strange that no infection of the subserous tissue followed.

HYPERTROPHY OF THE PENIS.

DR. ORVILLE HORWITZ read a paper with the above title, for which see page 167.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

I. Carbolic Acid Gangrene. By DR. HOUSELL (Tübingen). Until lately little attention, compared to that attending the systemic poisoning, has been given to the local effects of this antiseptic in producing the so-called carbolic gangrene. Such a process is probably not uncommon, although but few cases are published. Judging from the statistics of several institutions, it occurs perhaps once in every thousand surgical cases. Only forty-eight recorded cases are to be found in the literature. The unfortunate results usually soon follow, frequently over night, the application of the dressing, and, moreover, are seldom attended with any appreciable degree of pain. The affected finger or toe is found to be of a whitish-yellow color at first, later becoming brown or black, stiff, cold, and lacking sensation, even in the deeper tissues.

In the forty-eight published cases, a 5-per-cent. solution was employed thirteen times, in the remainder from 1 to 5 per cent. It is important to recognize in practice that a strength of 1 or 2 per cent. can produce gangrene. That a particular predisposition towards gangrene is found in the case of women and children, on account of their more tender skin, is not verified by the collected statistics.

Undue or uneven compression of a finger by the bandage or dressing has sometimes been thought responsible for the gangrene, but in a certain proportion of cases such a cause is evidently out of the question from the distribution of the process. The action of the carbolic acid is undoubtedly favored by a lack of evaporation.

It seems necessary to determine whether these weaker solutions produce gangrene as does the strong acid by caustic action, or in some other manner. Tillaux believes that the gangrene is due to the weight of the carbolic acid in solution causing it to sink to the bottom of the solution, and when the last part is used represents a far greater strength than would intentionally be employed.

Kortum seeks the cause in a neuroparalysis. Such a theory, however, would scarcely explain how a finger can become gangrenous over night. Frankenburger believes in the specific action of the carbolic acid on the blood and vessels resulting in thrombosis. Levai found that carbolic acid in common with other chemicals, but perhaps to a lesser degree, caused oedema and hyperæmia followed by necrosis of the several layers of tissue. In the author's own experiments there also developed a thrombosis, but not usually preceding the necrosis of the tissues. The gangrene produced by the carbolic acid possesses no characteristics peculiar to itself. In all probability the cause of the gangrene is due to a subcutaneous oedema, which may likewise be produced by other chemical agents. In such unyielding tissues as the finger and toes gangrene quickly follows.

It is the physician's duty, therefore, in view of the dangerous possibilities, to dispense with the use of carbolic acid as a dressing for the extremities in any and all strengths. Further, carbolic acid should not be dispensed by druggists except on a physician's prescription.—*Beiträge zur klinischen Chirurgie*, Band xix, Heft 3.

CHARLES L. GIBSON (New York).

II. The Ligation of Vessels in Inoperable Tumors and in Certain Infections. By M. TUFFIER (Paris). The idea of causing atrophy of a tumor by preventing the arrival of nourishment is ancient; but the deplorable results obtained in the pre-antiseptic era threw a discredit which has persisted upon the method. Tuffier believes that in certain selected cases ligation can render real service. Neoplasms must be classed according

to their seat. Certain regions obtain their nourishment through so many vessels that ligation is powerless to produce true anæmia; such regions are the face, mouth, and pharynx. Tuffier has proved to himself that simultaneous ligation of the two linguals or of both external carotids do not even render the tongue or face pale.

Arterial ligation can only lead to atrophy of such organs as depend for vascularization on one, two, or four principal pedicles. Experiments have been made on organs with a single pedicle,—*e.g.*, the kidney and the spleen,—and on organs with several pedicles,—*e.g.*, the uterus.

In 1892 Tuffier ligated the broad ligaments for a fibroid of the uterus in which the cachectic state of the patient forbade removal. The fibroid disappeared.

The malignant tumors attacked have been cancers of the tongue and of the uterus.

Bilateral ligation of the linguals or carotids gave perfect operative results, but were purely palliative; pain and hæmorrhage stopped for some weeks, but the tumor never ceased growing. In one case of uterine cancer the success was remarkable. The woman suffered from an inoperable uterine cancer, the pain of which was so great that, as a palliative measure, Tuffier tied the four uterine pedicles by the abdominal route. Bleeding gradually diminished, the general health improved, and the patient was able to leave hospital. An error in diagnosis was believed to have been made. Sixteen months later the patient was examined, the tumor found, a portion excised, and proved to be epitheliomatous.

Ligation of the afferent vessels is justifiable in certain pathological states, such as enlarged spleen.

Vascular ligations are indicated in certain infections. The operation may be done with two objects, (*a*) to prevent absorption of toxins manufactured in the lesion, by ligating the veins; (*b*) to impede the elaboration of the poisons by preventing the arrival of materials necessary for their elaboration, by means of

arterial ligation. In the first group are ligations of the internal jugular vein in sinus thrombosis, of the saphenous vein in grave cases of phlebitis. Arterial ligations have been less practised. Tuffier has used the method in the case of a woman with multiple miliary abscesses of the kidney, where the general condition forbade nephrectomy. He placed a forceps on the renal pedicle. Symptoms of infection ceased, the kidney eliminated itself through the wound, and the patient was considered saved, when the same accident happened on the other side, and she died.

M. Hartmann (Paris) has used the method in several cases of tumors. In cases of cancer the results were *nil*, but in uterine fibroids he has seen symptoms disappear and the tumor decrease in size.—Proceedings of the French Congress of Surgery, *Revue de Chirurgie*, No. 11 (Supplement), 1897.

JOHN F. BINNIE (Kansas City).

III. Large Doses of Antitetanic Serum used with Success. By S. J. MIXTER, M.D. (Boston). Patient, a boy, eleven years of age. Nature of wound, a cut of foot by broken glass. Time from reception of wound to first appearance of tetanic symptoms, eight days. Time from first symptoms to first injection of serum, forty-eight hours. Condition when treatment was begun, spasms with opisthotonos of mild type every twenty minutes. Amount of first injection, eighty cubic centimetres, of State Board antitetanic serum, under skin of thigh.

Third day of disease: Convulsions more severe; second injection, deep into thigh muscles, 540 cubic centimetres of serum.

Fourth day: Spasms less frequent. Third injection, into median basilic vein, of 100 cubic centimetres of Gibier's serum. Same day, some hours later, fourth infusion of 250 cubic centimetres, State Board serum. Repeated severe spasms followed quickly after this infusion, but later marked improvement occurred.

Fifth day: Spasm again frequent and severe. Fifth infusion of 240 cubic centimetres of serum; thirteen hours later a sixth

infusion of 240 cubic centimetres of serum was made. Spasms frequent and severe, so that on sixth day, in the morning, a seventh infusion of 480 cubic centimetres was made.

Seventh day: The eighth infusion of 480 cubic centimetres was made at 8 P.M., after which, during the night, there were only three severe spasms.

Eighth day: At 4 P.M. the ninth infusion of 480 cubic centimetres was made, followed, in half an hour, by very severe spasms, requiring full ether anæsthesia for half an hour to control them.

Ninth day: No injections; several hours natural sleep, with body resting on heels and shoulders.

Tenth day: Tenth infusion of 100 cubic centimetres. Entire muscular relaxation between spasms for first time.

Eleventh day: Eleventh infusion of 100 cubic centimetres.

Twelfth day: Spasms of mild character every hour; twelfth infusion of 100 cubic centimetres.

Thirteenth day: Only five spasms this day. Thirteenth infusion of 100 cubic centimetres.

Fourteenth day: No convulsions; patient delirious from effects of ether.

Fifteenth day: One slight tetanic spasm during night. No further serum injections made. Jaws were entirely relaxed and mouth opened normally for the first time on the nineteenth day. Patient slowly convalesced.

The reporter adds that this case was in no sense one of chronic tetanus; all others occurring in the Massachusetts Hospital, that had approached this in severity, had died. The treatment varied from that used in other cases only in the large doses of antitoxin given. In all, this patient received 3400 cubic centimetres, averaging about 285 cubic centimetres daily.—*Boston Medical and Surgical Journal*, October 6, 1898.

IV. Effects of Intravenous Saline Infusions. By GEORGE W. CRILE, M.D. (Cleveland). The author, as the result

of experiments on more than two hundred dogs, finds that intravenous infusion of normal saline solution causes, in the first instance, an increase in the venous pressure in the vena cava, and, consequently, the output of the heart is at once increased, the amplitude of the strokes lengthened, the chambers being full of blood; contractions, in consequence, become more forcible and the blood-pressure rises after several beats after beginning of saline flow. The peripheral venous, the vena cava, portal, peripheral cephalic, and central pressures all rise together. The rise of the vena cava and peripheral venous appears first and last, and after the lapse of some time the portal would rise, but rose proportionately higher than the other pressures. If a small quantity is injected, the rise will likely not be sustained. In a ten-kilo dog as much as 750 cubic centimetres was continuously injected, and the elevated pressure was finally sustained. Injections of quantities of fifty cubic centimetres at intervals as needed serve the purpose well. Quantities up to twice the amount of blood calculated to be in the animal have been given before the pressure was sustained. After this considerable injection the wounds everywhere began oozing and the tissues became fairly wet. Hæmorrhages that had been insignificant recurred vigorously. Various temperatures, ranging from 18° to 53° C., were employed and within a reasonable range, the effect seemed to be the same. The effect is apparently wholly mechanical. In a small dog 500 cubic centimetres at 53° C. were injected while the rectal temperature was being taken, and found to have increased the temperature but one-fifth of a degree. Hæmorrhage, after injection of considerable saline, shows little tendency to spontaneous arrest or clotting. The combination of small and frequently repeated hypodermic injections of strychnine, together with saline injection, makes a most effectual combination. Strychnine alone causes acceleration of the heart, with shorter beats. Saline alone causes a more forcible but a long sweeping beat. The combination of both produces a more sustained effect, and a more nearly normal beat.

Small doses, more frequently repeated, producing an effect, similar to the steady increment of a continuously flowing stream of saline, have appeared to produce the best results.—*American Gynecological and Obstetrical Journal*, March, 1898.

V. Sterilization of Catgut by Formaldehyde Gas. By M. HARRINGTON, M.D. (Boston). Place the skeins of catgut in a glass jar, say of 2000 to 6000 cubic centimetres capacity, in which has also been placed a small glass beaker containing a dozen paraform pastilles, over the top of which is placed a cover of copper gauze. Close jar with tightly fitting stopper. Leave undisturbed for three days. Culture tests show complete sterilization of the gut after the first day of exposure. There is no loss of tensile strength nor impairment of flexibility by this process. Dry formaldehyde gas, volatilized spontaneously from paraform pastilles, has as great germicidal properties as the moist vapors from formalin.—*American Journal of the Medical Sciences*, cxv, 544, May, 1898.

HEAD.

I. The Histological History of Dead Bone and Ivory implanted in Cranial Defects. By DR. MAX DAVID (Berlin). The author, in a former research, found that portions of living bone reimplanted in the skulls of dogs continued to live, and became united to the surrounding bone. Barth, on the contrary, as a result of experiments carried out by him, came to opposite conclusions. He maintains that living bone, after being replanted, always dies, and that the subsequent phenomena observed are exactly the same as when dead bone or ivory is used instead of the living bone. As a result of Barth's work Dr. David was led to the following fresh investigations: The experiments were carried out on dogs. Portions of the skull were removed with the hand-trephine, and the defects were accurately closed with ivory or with the bone that had been removed, but which was killed by boiling for fifteen minutes. In all the experiments healing took place without trouble. The investigation was easiest when ivory

was used, as its structure rendered it easily distinguishable from its surroundings.

(a) *When Ivory used.*—The great resisting power of ivory is such that it takes a long time for it to become healed in the skull. After four or even eight weeks there were only very indistinct traces of erosion about the margins of the implantation. It was only after twenty-six weeks that distinct, though slight, changes were noticeable. These consisted in erosions of the ivory by new-formed vessels and cell-growth proceeding from the connective tissues on every side. Near this cell-growth which invades the ivory new bone develops. The new bone is easily distinguished from the ivory. At this stage the skull surrounding the scar is much thickened. The dura and pericranium are locally thicker than normal. In the skull the Haversian canals are much dilated, are confluent, and form small irregular spaces. The canals contain blood-vessels and bundles of connective tissue, both of which arising from the scar pass along into the spaces above mentioned. The walls of the spaces are lined partly by giant-cells, partly by several layers of irregularly shaped cells. All these appearances are most marked near the scar, and must be considered a reactive osteitis by which the living bone represents the foreign body.

Examination of a specimen, obtained fully a year after implantation, supported von Bergmann's dictum, that "dead bone or ivory are destroyed by lacunar resorption, but that they, when small, may serve as scaffolding for the regenerating bone." Resorption takes place as follows: From the pericranium, the dura, and the scar (*i.e.*, the cut edge of the bone) nests of giant-cells penetrate the ivory and act as osteoclasts. These cells form cavities in the ivory and render it possible for vascular loops to enter. The cells of the adventitia of the vessels which have entered the ivory change, and become, so far as can be learned from the sections examined, typical bone-cells; the whole adventitia becomes ossified. This process is more distinctly noticed in oblique and longitudinal than in transverse sections of the ves-

sels. At first a lamellar arrangement of the bone is not distinct, but later becomes clear. The new-formed bone often has a cavernous appearance which reminds one of diploë.

From the above facts it is evident that ivory can heal into a defect in the skull without causing any bad symptoms; that it may very gradually be replaced by bone; that this bone is derived from the pericranium, the dura, and the scar, while the neighboring bone in the skull merely exhibits at the beginning a reactive inflammation, and has nothing to do with the reossification.

(b) *When Dead Bone used.*—As in the experiments with ivory, the animals used were killed, and the specimens examined at periods of one, two, three, four, six, eight, twelve, and twenty-six weeks after operation.

At the end of one week it was found that the implanted piece of bone is united to the rest of the skull by connective tissue. Here also is found the same osteitis as has already been described.

From the end of the second week evidences of destruction of the dead bone are manifest. The attack is made from the dura, the pericranium, and the scar. The dead bone is replaced by living, and by the eighth week it is difficult to distinguish the dead from the living. Varying with the individual animal used, the length of time necessary for healing varies. On the whole, the process is the same as in the case of ivory.

In support of his views, the author quotes the results of researches by Ochotin,—“White transplanted bone surrounded by fibrous tissue becomes organically united to this tissue; dead bone, on the other hand, is merely encapsulated in it. As soon as transplanted living bone is united by new-formed bone to old bone then it partakes at once in its life and function, while dead bone, under such circumstances, merely is absorbed more rapidly and *replaced* by new bone. The result in both cases is the same, to wit, filling of the bone defect.”

Comparing the histological results of his previous research

on the transplantation of living bone (*Archiv für klinische Chirurgie*, Band liii) with the present on implantation of dead materials, the author cannot understand Barth's position. He concludes that dead bone and foreign material become absorbed and replaced by new-formed bone, while transplanted living bone becomes vascularized anew from the neighboring tissues, and continues to live.—*Archiv für klinischen Chirurgie*, Band lvii, 533.

II. Cirroid Aneurism of Infectious Origin. M. J. REVERDIN (Geneva) has seen one case of cirroid aneurism of the eyebrow which he thought threw light on the still obscure pathogeny of this disease. In March, 1895, a man of thirty-one years suffered from an infectious gastro-enteritis, characterized by a typhoid state, a low fever, vomiting and diarrhoea, epistaxis, slight albuminuria, followed by a neuritis of the median, ascites, and œdema of the lower extremities. At the beginning of the illness there was a swelling with œdema and tenderness at the root of the nose. Recovery was effected and strength little by little returned. In the following spring at the inner part of the left eyebrow there was noticed a small swelling, which gradually increased and assumed the characters of a cirroid aneurism. The tumor was nodular, and one could see in it a net-work of dilated and tortuous vessels. There was dilatation, tortuosity of the neighboring vessels, and a bruit and thrill. The following interpretation of the case was given by Reverdin: At the beginning of the disease an infective arteritis occasioned the tumefaction at the root of the nose, leaving as a legacy an organized thrombus in an arteriole, which was found in the specimen after operation; the arteritis weakened the walls of neighboring arterioles, which by degrees became dilated, and thus gave rise to the aneurism. Like various other authors, he thinks that an arteritis may be the cause of cirroid aneurisms following traumata, perhaps also of those consecutive to nævi and of those denominated spontaneous. This idea unifies the pathogenesis

of cirroid aneurism. Proceedings of the French Congress of Surgery, *Revue de Chirurgie*, No. 11 (Supplement), 1897.

JOHN F. BINNIE (Kansas City).

ABDOMEN.

I. Nutrition and Digestion after Complete Removal of the Stomach. *Œsophago-Enterostomy in Man*. By DR. CARL SCHLATTER (Zurich). A number of cases of resection of the stomach, some of them successful, have been reported in recent years. None of them, however, is an instance of a total removal of the stomach in the pure sense of the word, as a small portion, generally the cardiac end, was left behind.

Dr. Schlatter is the first successfully to extirpate the *entire* stomach in a human being, the line of section passing through the duodenal and *œsophageal* tissues.

The patient was a woman, fifty-six years old, presenting gastric disturbances of some years' duration, which had notably increased in severity in the last few months. A tumor could be felt in the epigastrium.

On admission to the hospital, August 26, 1897, a prominence was visible between the left costal arch and the umbilicus. In the region of the stomach a long, oval, hard tumor, about the size of two fists, could be felt. Patient was markedly emaciated, complained that all food, even milk, was at once rejected, and begged for operative relief at all hazards. In view of the large size of the tumor it was feared that neither resection nor gastro-enterostomy would be feasible, as there was probably not sufficient area of healthy tissue to establish an anastomotic opening. She remained under observation for some days, during which nearly all fluid nourishment was rejected directly after ingestion. The iodide reaction was obtained in forty-seven minutes,—no free hydrochloric acid.

On September 6, in the absence of Professor Krönlein, Dr. Schlatter performed an exploratory laparotomy. The entire stomach from pylorus to cardia was represented by a hard but

surprisingly movable tumor, readily lifted out of the belly. Three rather soft glands were found along the greater curvature near the pylorus. Gastro-enterostomy was obviously out of the question; nothing but a total extirpation or a jejunostomy could meet the existing conditions. The stomach was isolated along both curvatures, the greater and lesser omentum being clamped off and tied with silk, and the stomach pulled well down to gain access to the œsophagus. The left lobe of the liver, which obscured the field of operation, was held back by the hand of an assistant, and permitting the application of an intestinal compressor well up on the œsophagus. A clamp was placed close to the cardiac limit of the tumor, and the stomach divided exactly at its junction with the œsophagus. The cut surface was somewhat oblique, and the lumen of the œsophagus was narrowed by a few sutures. The pyloric portion was treated in the same manner, the duodenum being freed in the direction of the head of the pancreas and divided between compressors placed on either side. The three glands were also removed.

The end of the duodenum was so fixed that it could not be dragged towards the œsophagus; it was therefore inverted and its lumen closed by a double row of sutures. A point in the jejunum, thirty centimetres from its beginning, was passed over the transverse colon and approximated to the œsophageal opening. After isolation of a portion with Wölfler's clamps, it was united to the œsophageal stump by sutures of the serous coats, an opening of one and a half centimetres made, and the mucous membrane stitched to that of the œsophagus in its entire circumference. A second continuous suture united the muscular and serous coats, and finally came a row of interrupted Lembert sutures. The compressors were then removed, the one on the œsophagus having been on over two hours. The line of suture retracted above the œsophageal opening of the diaphragm; suture of the entire abdominal wound. At the close of the operation the pulse was 96, regular, and tolerably full.

The extirpated stomach measured, on the greater curvature, twenty-eight centimetres; on the lesser, twenty centimetres; greatest transverse diameter, ten centimetres. The lumen of the stomach was so obstructed that at either end the index-finger could be introduced only with the greatest difficulty. Microscopic examination showed the presence of duodenal and oesophageal tissue at either end. The tumor proved to be a small alveolar glandular cell carcinoma. Adjoining lymph-glands not carcinomatous.

Patient was fed by enemata directly after operation; the next afternoon tea and milk were given by mouth and well borne.

September 8.—Nutritive enemata not retained. Small amounts of red wine were given by mouth.

September 9.—Subjective condition improved. Takes milk, eggs, bouillon, and wine at intervals of two hours, to which were added, experimentally, pepsin and hydrochloric acid.

September 13.—Wound healed by primary union. Given scraped meat.

September 16.—General condition excellent. At 7 A.M. takes three decilitres of milk with one egg; 9.30 two decilitres and one egg; noon, some meat scraped or chopped or a cup of gruel; 4 P.M., cup of gruel with egg, or milk with egg; 7.30, milk or gruel. In the intervals drinks tea and about 200 cubic centimetres Malaga wine per day. Vomited to-day for the first time.

October 8.—Has vomited several times of late. Examination showed acid reaction (pepsin and hydrochloric acid discontinued), no free hydrochloric acid, lactic acid present, also gallic acid and biliary pigment.

Patient finally made a good recovery and in less than two months gained four and four-tenths kilos.—*Beiträge zur klinischen Chirurgie*, Band xix, Heft 3.

C. L. GIBSON (New York).



FIG. 1.—Gastro-enterostomy. Incision made in stomach and in intestine.



FIG. 2.—Gastro-enterostomy. One blade of forceps has been inserted into the stomach.



FIG. 3.—Gastro-enterostomy. Both blades are inserted in the parts to be approximated

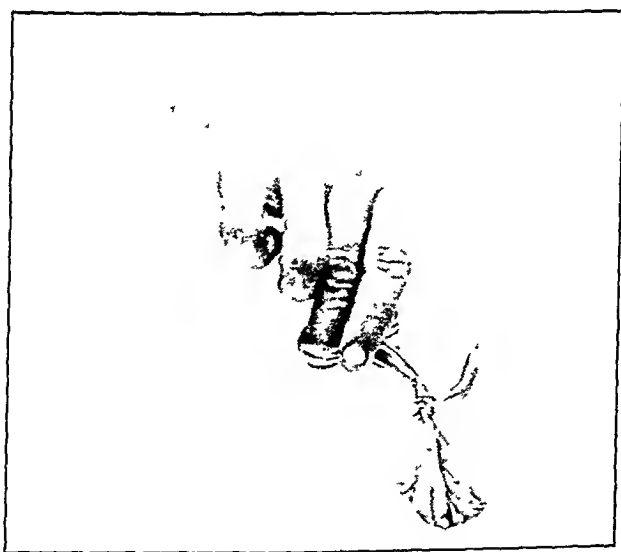


FIG. 4.—Gastro-enterostomy. The forceps are closed and clamped, approximating the serous membrane of stomach to intestine.



FIG. 5.—Gastro-enterostomy. Sutures have been applied circularly ; the clamp is removed, loosening the orceps.



FIG. 6.—Gastro-enterostomy. One half of the forceps is unclamped ; its grasp upon the tissues is loosened, and is removed by a semicircular motion through the small unsutured aperture.

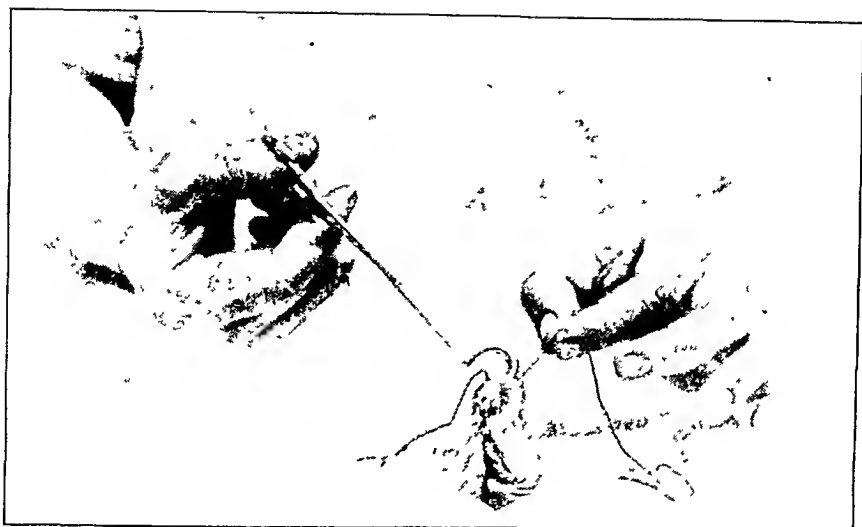


FIG. 7.—Gastro-enterostomy. The second half of the forceps is likewise removed.



FIG. 8.—Gastro-enterostomy. One or two more sutures close the opening through which the forceps were removed.

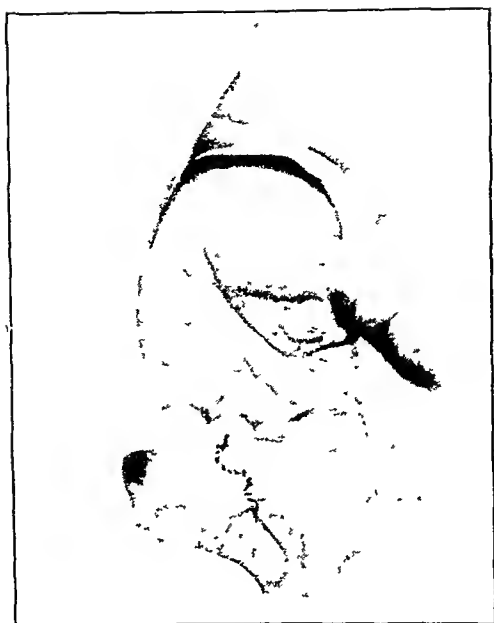


FIG. 9.—Gastro-enterostomy. The operation is completed.

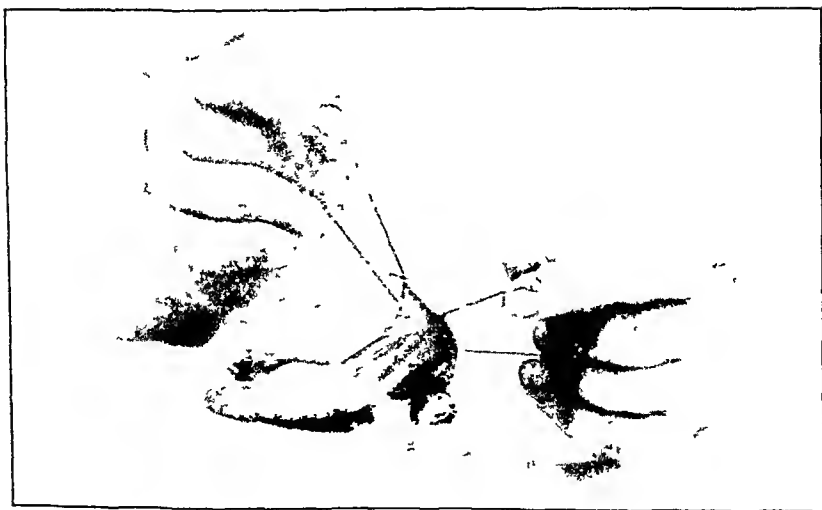


FIG. 10.—End-to-end anastomosis. Four fixation sutures are applied at the cardinal points, uniting the ends to be approximated.

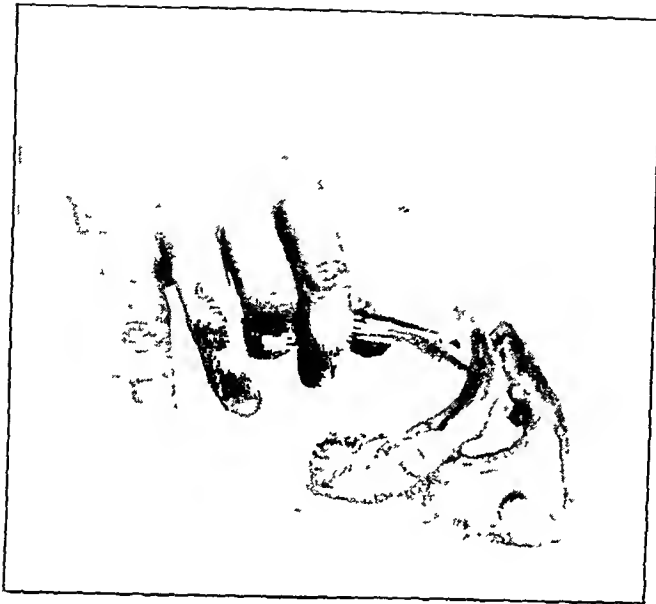


FIG 11.—End-to-end anastomosis. The forceps is introduced between two sutures, and one blade is made to pass into each gut.



FIG. 12.—End-to-end anastomosis. The forceps is clamped, bringing serous membrane to serous membrane; sutures have been applied circularly.

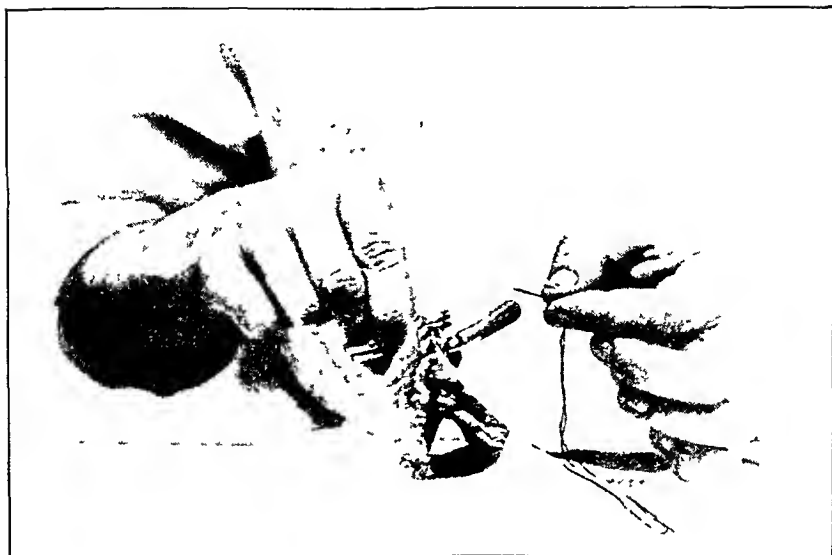


FIG. 13.—End-to-end anastomosis. The suturing is completed.



FIG. 14.—End-to-end anastomosis. One half of the forceps is being removed from small unsutured opening.



FIG. 15.—End-to-end anastomosis. Removal of second half of forceps.

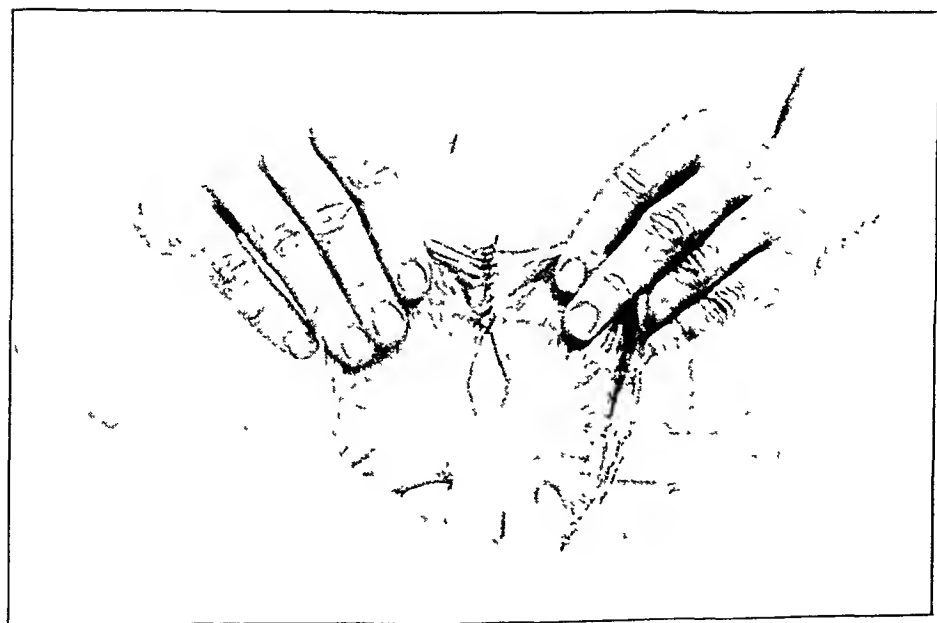


FIG. 16.—End-to-end anastomosis. The anastomosis is completed.

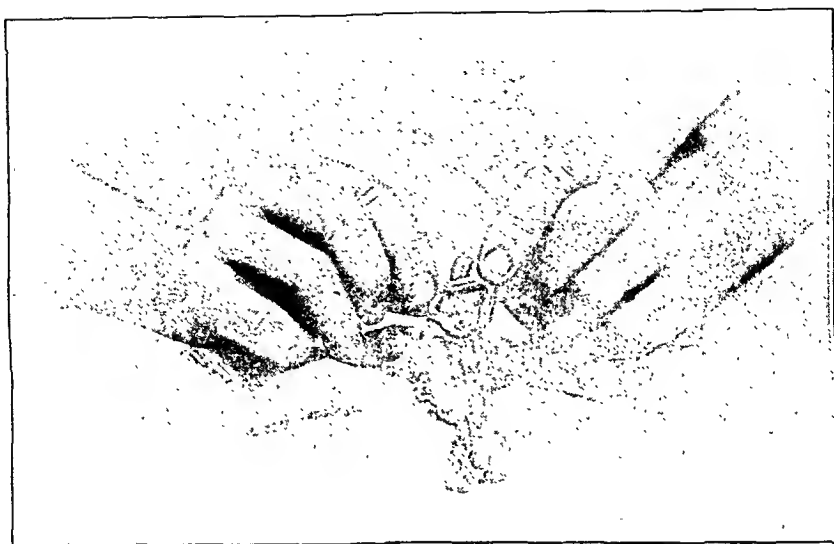


FIG. 17.—Invagination. End of gut to be invaginated.

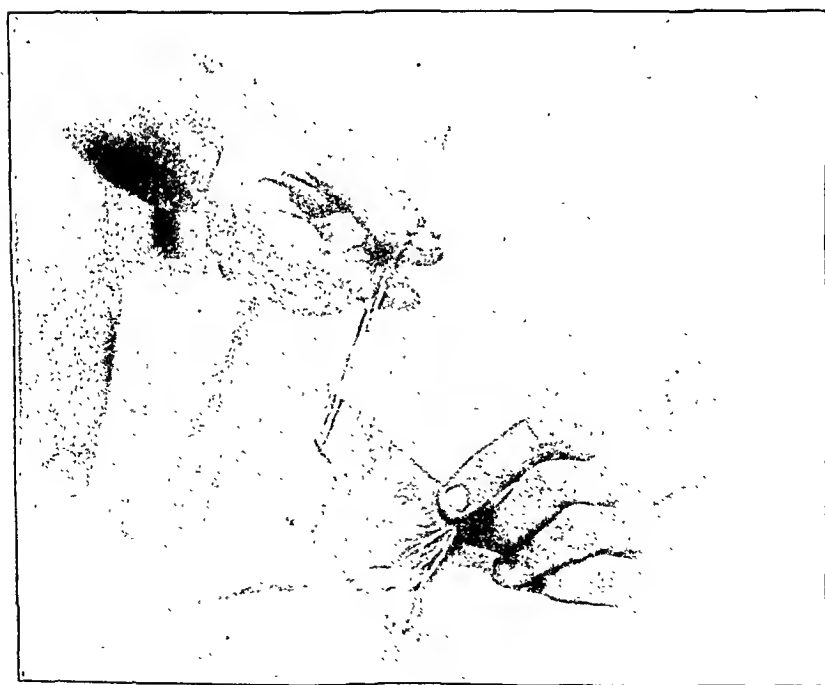


FIG. 18.—Invagination. End of gut is clamped with forceps.

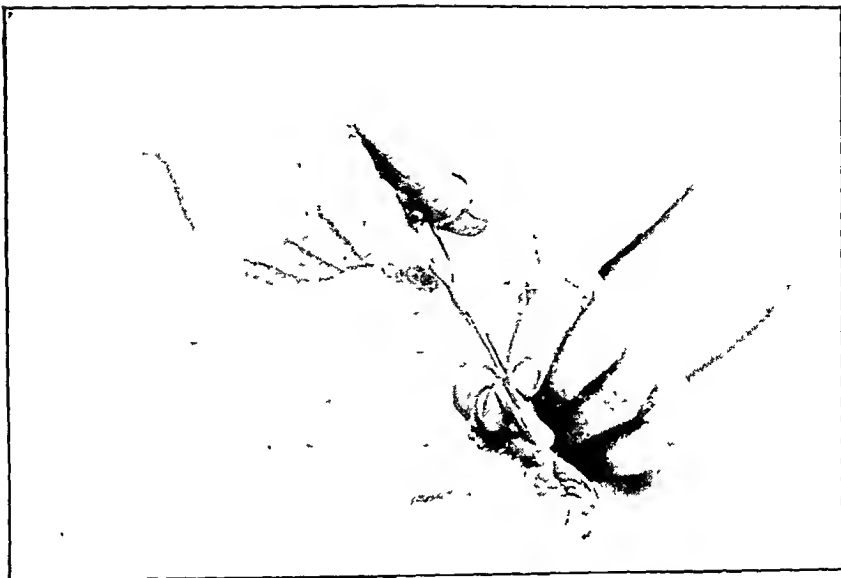


FIG. 19.—Invagination. End of gut is pushed down and invaginated.

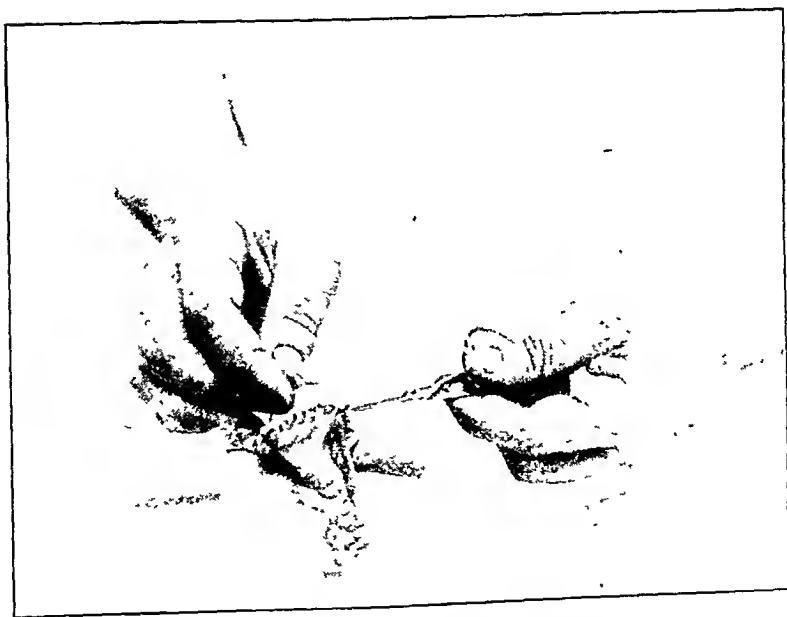


FIG. 20.—Invagination. Sutures are applied superficially to the place where the forceps is.

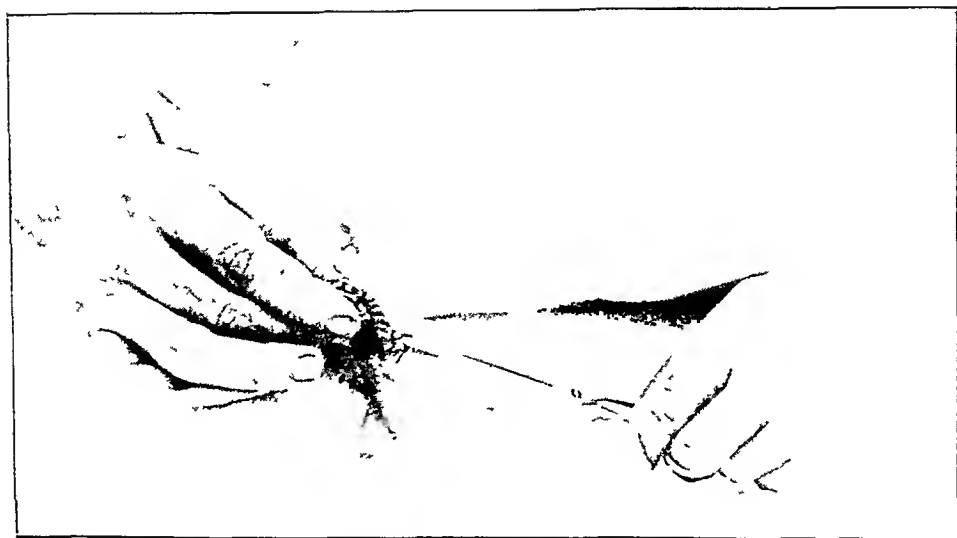


FIG. 21.—Invagination. The forceps is loosened and withdrawn.

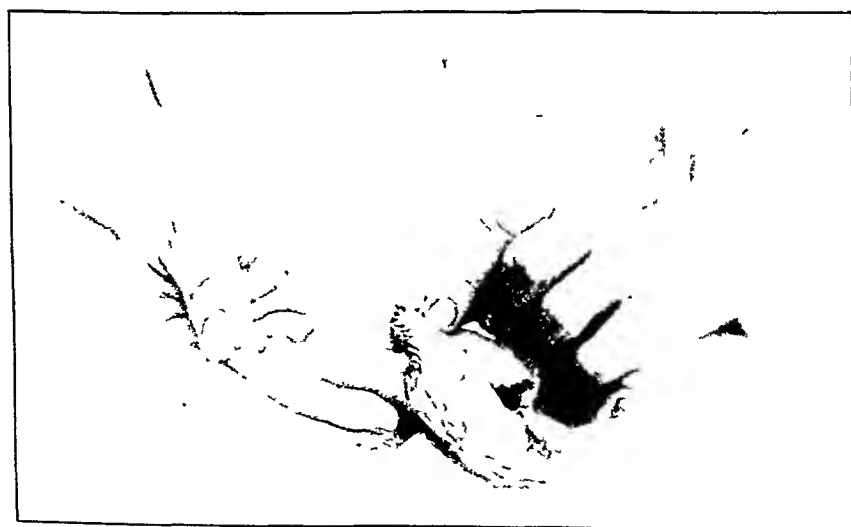


FIG. 22.—Invagination. One more suture completes the operation.

A NEW FORCEPS FOR INTESTINAL ANASTOMOSIS.

BY ERNEST LAPLACE, M.D.,

OF PHILADELPHIA,

PROFESSOR OF SURGERY IN THE MEDICO-CHIRURGICAL COLLEGE.

THE many short-comings of the present mechanical means for facilitating intestinal anastomosis have resulted in a general tendency to abandon them in favor of the suture method, unaided by any artificial means. The necessity, however, for rapidity and accuracy in suturing while performing the various operations for anastomosis of the intestines, as well as the simplification of the procedure, has led us to devise a forceps which presents the following characteristics:

(1) It consists of two rings, introduced into the intestines to be anastomosed, and acts as a support to the parts while suturing them.

(2) The forceps, being separable into two halves, can be gently withdrawn from a small aperture still unsutured, and the anastomosis is completed by adding one or two sutures.

The method offers the following advantages: First, rapidity and accuracy of suturing without leaving any foreign substance within the gut; second, an absolute control of the field of operation by means of the assistance of the handles of the forceps; third, the facility with which the forceps are applied, preventing the escape of intestinal contents during the operation.

There are five sizes of the forceps, for intestines of various calibre, as well as for the more delicate work on the gall-bladder (cholecystenterostomy). (Fig. 4.)

The preceding illustrations (Figs. 1 to 22) give a fair idea of the appearance of the instrument, as well as the various steps in the technic.

DESCRIPTION OF THE INSTRUMENT.

The forceps consists of two parts, which are really hæmostatic forceps. curved into a semicircle on each side (Fig. 1); only held together by means of a clasp, they open as two rings (Fig. 2). They are opened within the intestine, and serve the same purpose as Senn's rings or any other ring that has been devised, bringing serous membrane to serous membrane. Accurate suturing is the operation of the present. Therefore, if these forceps are within the gut, and sutures are applied, as they would be with the help of Senn's rings, it follows that sutures are introduced all around, except where the forceps penetrate the parts that are sutured.

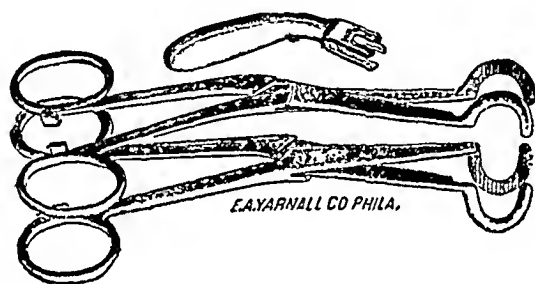


FIG. 1.—The hæmostatic forceps bent into semicircles, and clamped to hold them together.

The suturing being done, the forceps are released by loosening the clasp, and then withdrawing the forceps out of the small opening; first one-half, then the other, when the operation is finished by a stitch or two. This forceps will serve for the operation of end-to-end anastomosis, and also of lateral anastomosis.

Gastro-Enterostomy (Lateral Anastomosis).—An incision is made in each part to be anastomosed about the length of the diameter of the rings to be used. In our illustration gastro-enterostomy is performed. An incision has been made into the stomach and one into the gut. Opening the forceps one blade has been introduced into the stomach, then the other blade is put into the intestine, and the two blades are then closed. This holds in close contact the serous mem-

brane of the stomach and intestine, while sutures are applied all around, except, of course, at the small place where the instrument penetrates the stomach and the gut. Continuous sutures are used in the illustration, but any suture may be employed. The handles are made to raise the parts up, and afford support as well as a broad surface to work on. Having united the stomach and intestine, as far as is desired, the forceps are easily loosened by removing the clasp.

The forceps constituting one-half of the ring is loosened, and drawn out with a semicircular motion, then the other is removed in the same way. Finally one or two more stitches are applied to close the opening through which the forceps were removed. This completes the operation, which shows

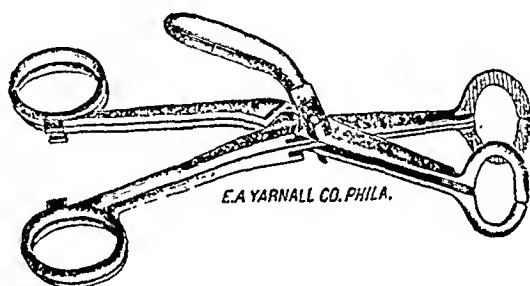


FIG. 2.—The forceps clamped together, and opened as two rings.

that the suture was more regular than could possibly have been applied without a support and the support did no harm to the intestine. The mechanical means only serve to make the manual execution better. The guidance of the ring forces us to preserve the proper direction in suturing.

End-to-End Anastomosis.—Having resected the required amount of intestine, the two ends are first united by a fixation stitch at the four cardinal points. This assures the right relation of the mesentery in the two ends of the gut. The forceps are introduced between two of these stitches. The blades are opened apart so that one penetrates one end and the other the other end. The serous surfaces are inverted, or pushed in. This may be facilitated by drawing a thread around the united ends between the two blades. The forceps

is clamped. When the forceps is clamped serous membrane is in apposition to serous membrane. The sutures are then applied all around the clamped surfaces, to the point where the forceps penetrates the gut. The clamp is removed; one-half of the forceps is removed. The other half is then removed. The operation is completed by adding one or two stitches to close the opening through which the forceps were removed. The calibre of the gut is preserved.

Invagination.—Should it be desired to make an entero-enterostomy with invagination of the ends of the gut, the accompanying forceps (Fig. 5) facilitates the invagination, and obliterates the end of the gut. It consists of a long, slender, straight hæmostatic forceps. The end of the gut is

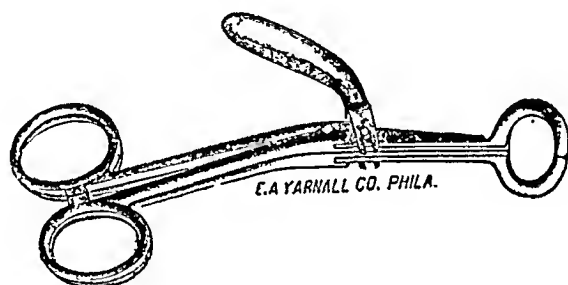


FIG. 3.—The forceps closed.

clamped and pressed down within the calibre of the gut; the serous membrane on each side thus rises and is rapidly sutured under the control of the instrument. When the suturing is done, the instrument is loosened and withdrawn; one more suture is applied at the point where the instrument penetrated. This makes a very good stump, and is very expeditious.

This method was presented to the American Medical Association at Denver, Colorado, June 9, 1898. A full description of it appeared on the same date in the *Philadelphia Medical Journal*. Since then its use has become widespread, and the results obtained on the living have demonstrated its usefulness.

A demonstration of the workings of the forceps was

made before the Philadelphia County Medical Association, November 25, 1898, eliciting the following discussion:

DR. J. CHALMERS DA COSTA, who had previously seen the utility of these forceps demonstrated, by Dr. Laplace, on the intestines of a cadaver and on those of a living man, said that, to him, the instrument appeared to even greater advantage when used upon the thicker intestine of the living than it did when employed on the thinner intestine of the dead. The expediency of using a mechanical device in suturing had been largely debated and is still unsettled. The trend of surgical opinion is that, whatever disadvantages the

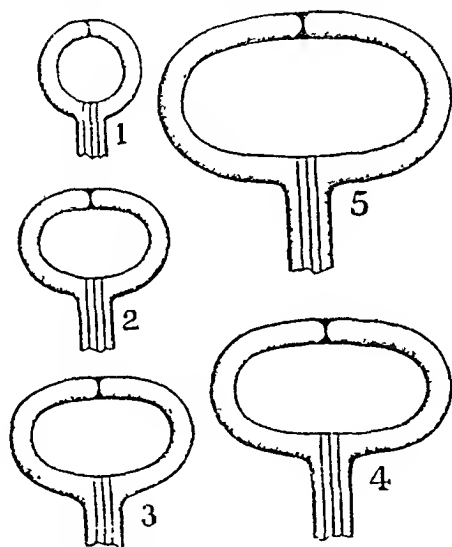


FIG. 4.—Various sizes of rings made for the forceps blades.

use of a mechanical device may possess, it greatly facilitates the application of sutures. The instrument of Dr. Laplace affords all the advantages to be gained from such mechanical devices as the Murphy button, bone-plates, etc., and yet it is free from their disadvantages, because the operator, having enjoyed all the benefit of the forceps, removes them, while such devices as the Murphy button must remain in the intestine, and be a cause of anxiety till they have separated and been discharged. A special virtue of the forceps is that they render it easy to place the sutures with mathematical cer-

tainty at the required distances. This is so because the rim of the instrument renders it extremely easy to catch the serous coat, and because the suture line not only is held in perfect and firm apposition, but can be kept under perfect control by the handles. The instrument is simple, and, unlike many other devices, may be successful not only in the hands of its originator, but of all who use it. It is destined to replace the mechanical aids of many other methods.

DR. ORVILLE HORWITZ said he had listened with a great deal of pleasure to the instructive demonstration of Dr. Laplace, and felt sure that his ingenious instrument will prove to be one of the greatest advances made in intestinal surgery in years. The objection to the catgut ring, bone-plates, bone-bobbins, and similar mechanical devices, is that in their employment much valuable time is consumed and a



FIG. 5.

foreign body is left in the intestinal canal. The Murphy button combines speed with a certain amount of safety, but no surgeon who inserts the button is without anxiety until it has been voided through the rectum. The rubber cylinder is a step in advance of either the rings or the bobbins. What Halsted claims for the cylinder is justifiable; the operator can dispense with clamps, the vermicular motion of the bowels is arrested, the adjustment of two ends of intestine, of unequal size, is facilitated, and, finally, valuable time is saved by its employment. The objection to the rubber cylinder is that it is a complicated device; often difficult to manage; its proper adjustment frequently requiring a good deal of time. Until the introduction, to the profession, of Laplace's anastomosis forceps, it was superior to any other mechanical contrivance devised to facilitate intestinal anastomosis, with the exception of the Murphy button, which was to be preferred

when time was an object. The anastomosis forceps will be found to be superior to the cylinder. The former is not so complicated, is easier of adjustment, and the operation can be performed with as much speed as in cases where the Murphy button has been used. Personal observation of the practical application of the forceps, in the hands of Dr. Laplace, at the Medico-Chirurgical Hospital, convinced Dr. Horwitz that this instrument is far superior to any contrivance that has been heretofore suggested or employed; and when the profession becomes familiar with the instrument, it will supersede any form of mechanical device at present employed in intestinal surgery.

DR. EDWARD MARTIN greeted the forceps as an admirable mechanical device that will improve intestinal technic. He applauded the modest manner in which Dr. Laplace had presented his instrument, and predicted that since it had done so well on the dead it would be much more efficient when used upon the living. It facilitates the operation, it expedites it, and finally makes the sutures very much more accurate. Moreover, the forceps are simple in construction. Yet facility in handling them should be thoroughly acquired, as the management of any new instrument should be, before employing it on a patient. This experience may be gained on the dog, but is preferably obtained upon the intestines of the recently dead. The technic of this instrument can be acquired much more rapidly than that of the ordinary intestinal suture, and an added advantage not mentioned by Dr. Laplace is that the metal instrument will guide the surgeon in suturing. Improvements short of being revolutionary in the field of surgical appliances rarely have a widespread adoption. This is to be deprecated, and while Dr. Laplace does not claim for this instrument any revolutionizing power, still any one who has attempted suturing through a thick abdominal wall with a short mesentery will probably supply himself with this forceps.

DR. HEARN expressed his belief that surgeons who opposed mechanical aid in intestinal anastomosis will be glad

to use Dr. Laplace's forceps. He advocates the use of the Murphy button where hurry is imperative to combat shock or long exposure, but recognizes that the sequences of the Murphy button are sometimes unpleasant,—*e.g.*, sloughing. Dr. Laplace's instrument is ideal.

DR. A. J. DOWNES was impressed by the ease with which Dr. Laplace used the forceps. He said that intestinal anastomosis only attained success with the advent of the Murphy button, the objections to which are well-known. From experimentation on animals, Dr. Downes was convinced, until very recently, that the ideal method of doing anastomosis was by the use of inflatable rubber bulbs or cylinders. But seeing Dr. Laplace use his forceps at a private demonstration, about two weeks before, he thought that forceps on this principle would prove the instrument of the future.

DR. RODMAN, who had seen several demonstrations by Dr. Laplace of his forceps, had been each time most favorably impressed by the instrument. Like Dr. Da Costa, he thought it the best of the mechanical aids that have been used in intestinal work, and predicted that it will displace all others. It is not quite so rapid a method as that of the Murphy button, but is free from the latter's many objections. Use of these forceps will not be attended by the same danger of pressure necrosis, of leaking from an intestine, of septic peritonitis, of intestinal obstruction, and of the lodgement of a foreign body in the stomach, as has been reported by Willy Meyer and many others who have used the button, and therefore the Laplace is an ideal method.

DR. M. PRICE pronounced the instrument perfect in its accomplishment of anastomosis, and said it would displace other devices. Although the Murphy button is the most rapid method, it cannot be any more accurate than the Laplace forceps, and has an exceedingly dangerous complication when a small intestine is fastened by it to the stomach, because there are two ends to the intestine, into either one of which the button may drop. If the case is cancerous, or of a similar character, a button that has gone the wrong way

will stay and ulcerate, and the complication ends the patient's life. This is also true in the anastomosis of a small intestine to a large one, in order to switch off a cancerous portion, and complete the lumen of the bowel. The forceps fulfils the indications in another way, and is absolutely clean. No matter how expert an assistant, it is almost impossible in performing intestinal anastomosis by former methods to keep fæces and gas from extravasating. The forceps keep the parts clean, and also in apposition throughout the suturing, which it much facilitates. End-to-end union in bowel of the same calibre it accomplishes with perfect ease. In anastomosis, the instrument of Dr. Laplace will be of great help; with a little ingenuity, it should meet all the complications to be dealt with. It is, probably, the best mechanical appliance yet seen in intestinal surgery. .

THE TREATMENT OF HÆMORRHOIDS BY THE PLASTIC METHOD.

By HENRY T. BYFORD, M.D.,

OF CHICAGO.

As a gynæcologic surgeon it is often necessary for me to conclude a series of pelvic operations by one for hæmorrhoids. It is under such circumstances particularly desirable to render the operation as clean and as little annoying to the patient as consistent with efficiency. None of the operations that I have seen performed have seemed to me to be in keeping with the best principles of surgery except Whitehead's, and that is a graver one than is ordinarily required, and is more of a procedure than one ordinarily cares to append to a series of other operations.

The method I have for some time employed, and which seems to me to be most in accord with good surgery, is to excise only such tissues as require excision, and to sew up the wounded surfaces as we would sew any and every fresh wound surface elsewhere. The arguments that the action of the sphincter interferes with union, and that the passage of fæces, etc., infects the stitches is out of date, and is disproved at least by my own experience. I cut off the hæmorrhoidal and cutaneous projections either separately or in groups without sacrificing any more mucous membrane or skin than is desirable, and sew the edges of the wound together in such a way that the anus will be lined with sufficient mucous membrane for normal expansion. By such suturing more tissue can be removed without interfering with the mucous lining than by allowing unsutured parts to cicatrize and, perhaps, to slough, as is so often done.

I usually pursue the following technic:

The patient is kept on a liquid diet, and the bowels are thoroughly evacuated the day before the operation. After the other work about the pelvis is finished the sphincter ani is slowly but thoroughly dilated, and the rectum washed out with sterilized water. If the sphincter is not, for the time being, paralyzed, the patient will not only be apt to suffer from its contractions, but the interference with rectal drainage and lavage may lead to infection of the sutures and prolonged discomfort.

The next step is to clamp such of the hæmorrhoids and redundant tissues all around the anus with T-shaped lock-forceps as are to be removed, in order to be able to judge at the outset how much anal mucous membrane will be left after the excision. The forceps are, as a rule, so placed that when the hæmorrhoids are excised and sewed, the lines of sutures will be longitudinal or parallel to the long axis of the rectum. Plenty of mucous membrane must be saved to line the anus after these wounds are thus sutured. But if the hæmorrhoids are too abundant to allow of this, then a portion of them should be removed in a transverse or diagonal direction,—*i.e.*, so that one or two lines of sutures will run diagonally or even transversely to the others. In this way a sufficiency of the deeper mucous membrane is drawn into the anus to make up for the deficiency. Some judgment must, of course, be used in order that folds and pockets may not be left.

What I have said does not appear to be very original, and doubtless many surgeons have operated somewhat similarly, but I do not know of any method in vogue that discards ligatures and makes a completely plastic operation, except Whitehead's, which in turn differs in that it amputates the rectal mucous membrane in continuity all around.

I use silkworm gut, because silk and catgut are liable to become infected to the extent of causing great suffering and perhaps failure of primary union. Silkworm gut has the quality of causing union even when secondary superficial infection takes place, provided the parts are well cared for; and it can be left in place as long as desirable without disad-

vantage. I use the mattress suture, because it includes more tissue and holds longer than the ordinary interrupted. The ends are left long and tied together in knots, one knot for each row of sutures.

I do not introduce the rubber tube covered with gauze into the rectum after the operation, although I suppose that in cases in which the sphincter ani cannot be paralyzed without being lacerated, the tube would promote drainage and produce more or less relaxation by its prolonged pressure.

The bowels, having been thoroughly emptied, are not moved until the third day. On the second night after the operation two teaspoonfuls of Rochelle salts, or six ounces of the liquid citrate of magnesium, are given, and repeated every twelve or twenty-four hours, as may be necessary, to produce one or two liquid or semiliquid stools daily. After each evacuation the lower rectum is douched out with warm water. This is easily accomplished by separating the bundles of silkworm-gut sutures, and inserting the rectal douche point between them.

A pad of dry gauze is placed between the nates, and changed every three or four hours, and also whenever soiled. Should there be any swelling and irritation about the anus, hot fomentations are applied or hot sitz-baths given twice daily. The sitz-baths soak out the irritating excretions, and often afford great relief and comfort.

The sutures may be removed in twelve or fourteen days. If those farthest inside cannot be reached, they can be left, for they include only soft tissue, and will usually fall out in two or three weeks. The external sutures, which include more or less firm connective tissue in their grasp, do not always come away without being cut.

The advantages of this method are that the parts heal rapidly; there is no subsequent retraction, and thus the condition afterwards will correspond to the condition produced by the sutures at the time of the operation; no raw surfaces are left; there is no danger of subsequent hæmorrhage; there is no cicatricial tissue produced; it is a rational method.

This method is more nearly like that of Coates for internal hæmorrhoids than any other I know of, but it also applies to the excision of external folds, and involves a different technic in the suturing,—viz., silkworm gut placed deep enough to hold for two weeks, and secure primary union of the edges of the skin or mucous membrane drawn over the raw surfaces in any direction, instead of superficial catgut sutures, necessarily placed in a longitudinal row.

THE TECHNIQUE OF SUTURING OF THE PATELLA AFTER FRACTURE.

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ALTHOUGH I am not, at the present time, prepared to say that I would advocate suture of the patella after fracture in each and every case, still results, especially those recently published by Dr. Charles Phelps, tend to lead me rather to this practice. This short note, however, will be entirely confined to a few remarks on the technique of the operation. This may be divided into three steps, the first of which is the opening of the joint and freeing the fragments of bone by cutting through all adhesions about, and these may be well developed and numerous if the case is of long standing.

The incision dividing the integuments and underlying tissues is made on the anterior aspect of the knee, but there are various ways of making it. König, for example, makes a transversal incision over the space formed by the separation of the fragments, so that the resulting cicatrix may be opened afterwards by movements of flexion of the knee. And what is of still greater importance, the cutaneous cicatrix may unite with that of the bone, so that if another fracture should occur the skin will naturally open with the fracture, resulting in an open wound, with all its serious consequences.

Other operators make a median longitudinal incision about five or six centimetres long; but if drainage is employed, and, I may say, it is desirable in many instances, two small lateral incisions must be made for the passage of the drain. A curved incision, similar to that employed for resection of the knee, extending from one condyle to the other

and passing over the space between the fragments of the bone, does not entail other incisions for drainage, as the wicks can be placed in the angles of the wound. This incision can be made with its convexity above or downward.

Now, the points on which I desire to lay particular stress in making the incision are as follows: In the first place, the incision should be made so as to *give plenty of room and freely expose the joint*, especially so when the fracture is of long standing. The flap should be well supplied with blood at its base, and the latter should be quite broad in proportion to the size of the flap.

The flaps used by Trendelenburg and Lucas-Championnière are poorly nourished, because the important vessels of the internal aspect of the knee are cut.

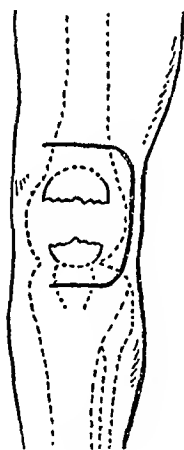


FIG. 1.

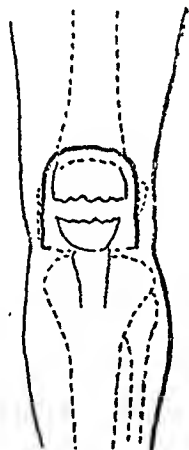


FIG. 2.

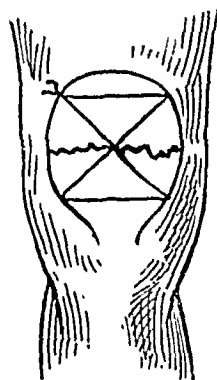


FIG. 3.

The third condition of a good incision is that the cutaneous cicatrix should be as *distant as possible from the cicatrix of the bone*. In order to fulfil these requirements I make a horse-shoe-shaped incision, keeping at least four or five centimetres away from the borders of the patella. (Fig. 1.)

It is commenced above the internal angle of the upper fragment and carried outward, then brought down almost vertically along the external aspect of the knee, and then, when it has been carried below the lower fragment, it is carried *nearly* to the anterior tuberosity of the tibia. This inci-

sion has been in my hands most useful when there is a considerable separation of the fragments, but when the fracture is recent or the separation slight a horseshoe flap with its base down is perhaps better. (Fig. 2.)

When the parts have been freely exposed, all fragments of bone and blood-clot should be cleaned out. Especial care must be taken to rid the parts of all clots, because the latter are often mixed with bits of periosteum and shreds of aponeurosis, forming quite a solid mass, filling the joint and the space between the fractured ends.

In cases of old fracture this part of the operation is always more complicated and often quite difficult, because the fibrous adhesions must be cut and the bony surfaces freshened with hammer and chisel. It occasionally is necessary to incise the aponeurosis and triceps in order to bring the fragments into contact, but before doing this they may be made to come together if the thigh and leg be elevated.

To suture the bone strong silver wire appears to me the only satisfactory material to use, and by drilling a triangle in each fragment with the apices directed towards each other, the wire may be entirely buried in the bone, excepting the point where the ends come out and are twisted. This manner of suturing will give the greatest amount of solidity, and has been entirely satisfactory. (Fig. 3.)

When one of the fragments is small and the other one large the above method of suturing cannot be applied, and in this case the wire should be passed through the ligament of the patella or through the tendon of the triceps.

PROSTATECTOMY.¹

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AMONG the many advances of modern surgery the operative treatment of obstructive prostatic enlargement deserves a very prominent place. The intelligent thought and skilful efforts which have been applied in this direction have been productive of many new procedures for the relief or cure of this very common and serious condition. Some of these procedures have been tried and found wanting, some of them are still in the balance, and some are undoubtedly of sufficient value to maintain a permanent place in surgery of the future.

They vary greatly in character, some merely aiming to partially relieve the sufferer by the establishment of permanent suprapubic or perineal drainage; some are intended for the relief of the obstruction only, such as the various forms of prostatotomy; others are claimed to reduce the hypertrophy by indirect means, such as castration, resection of the vasa deferentia, ligation of the internal iliac arteries, etc.; again, those which are claimed to accomplish the same object by direct but not radical attack upon the gland, such as parenchymatous injections and electrolytic puncture; and, lastly, those procedures which purpose cure of the patient by removal of the diseased gland itself,—namely, the various forms of prostatectomy.

It is not the object of this paper to review or describe all these various devices, so we shall pass at once to the subject as set forth in its title.

¹ Read before the New York Surgical Society, November 9, 1898.

Prostatectomy is essentially an operation of modern date, and there are in vogue at present several methods which have proven fairly satisfactory so far, but the operation is still in a process of evolution, and undoubtedly the best possible results have not yet been attained. The principal methods which are at present employed are as follows:

(1) Suprapubic prostatectomy without perineal drainage (McGill).

(2) Suprapubic prostatectomy with perineal drainage (Fuller).

(3) Suprapubic prostatectomy, combined with perineal section and drainage (Belfield).

(4) Perineal prostatectomy by extensive dissection (Zuckerkindl, von Dittel).

(5) Posterior prostatectomy by the sacral route (Rydygier).

(6) Perineal prostatectomy, combined with suprapubic cystotomy, without perineal drainage (Nichol).

(7) Perineal prostatectomy, combined with suprapubic cystotomy, with perineal drainage (Alexander).

The first three methods spoken of, in which the prostate is removed by the suprapubic route, are, in the main, dependent upon the same general principles, but having sufficient variations to mark them as distinct operations. They depend upon opening the bladder suprapubically, then upon making an incision in the floor of the bladder so as to reach the prostate, and then its removal by enucleation or by morcellation. While these methods have been productive of fairly good results, they are open to certain serious objections, one of the principal of which is the fact that the floor of the bladder is more or less extensively wounded; that the cavity from which the prostate is removed becomes at once part of the bladder-pouch, and is thereby a dependent receptacle for urine and exudates, thus rendering infection not only possible, but probable. This objection is not overcome when perineal drainage is resorted to, because the pouch still remains below the level of the tube within the bladder.

Perineal prostatectomy, performed by extensive anatomical dissection, as devised by Zuckerkandl, Dittel, Rydygier, and others, may be excellent from an anatomical standpoint, and is of undoubted use in the treatment of some cases where a very large tumor is present, but it has for its objection the fact that the operation usually is an extensive one, and that it must necessarily be more prolonged than by some other methods, which are serious elements against success in old and enfeebled patients, and also the fact that it does not afford the bladder the advantage of immediate and complete drainage, which is usually essential to the best results.

Perineal prostatectomy, combined with suprapubic cystotomy without perineal drainage, as devised by Nichol, has for its advantage the fact that it does not wound the floor of the bladder; but it is deficient, inasmuch as it does not supply the bladder with proper drainage, and the incision recommended is an unnecessarily elaborate one.

To my mind, perineal prostatectomy, combined with suprapubic cystotomy with perineal drainage, as devised by Alexander, is the best method so far practised. It is simple of performance, and is dependent upon very proper surgical principles, for the floor of the bladder is not wounded, the perineum is cut in the median line by a single incision, so that the least possible time is consumed and the smallest amount of hæmorrhage is encountered. The drainage of the bladder is in the line of gravitation, and the space from which the prostate is removed is not in immediate communication with the bladder cavity, and has perfect and direct drainage, while the urethra is not permanently damaged. In accordance with Alexander's description of this method it is performed as follows:

The patient is prepared for operation by proper emptying of the bowels and by as thorough a cleansing of the bladder as possible. The patient is anæsthetized, the bladder emptied, and then distended with borax solution, from eight to ten ounces being sufficient, in most cases, to bring the organ well above the pubes. The rectal bag is not employed.

The bladder is exposed by a vertical incision between the recti muscles, and two retraction-sutures are introduced through its wall. Between these an opening is made into the bladder large enough to allow the operator to insert two fingers. The bladder and the projecting portions of the prostate can then be thoroughly examined. With the suprapubic opening properly protected the patient is put in the lithotomy position. A broad, median-grooved staff is passed into the bladder through the urethra, and held by an assistant. The membranous urethra is then opened by a median perineal section, the floor of the urethra being thoroughly cut from just behind the bulb back to the apex of the prostate. The staff is then removed. With two fingers of the left hand passed through the suprapubic opening into the bladder, the prostate is now forced well down into the perineum. With the forefinger of the right hand the surgeon begins enucleation, which is performed entirely through the perineal opening. The fibrous sheath of the prostate, covering its posterior and anterior surfaces, is broken into by the finger, the capsule is entered, and the entire prostate shelled out from within its sheath by digital dissection. The inferior and posterior surfaces of the prostate should first be separated from the capsule. The mucous membrane of the bladder and prostatic urethra covering the enlargement, with the underlying muscular tissue, is stripped up from the part to be removed, but is not opened. The lateral lobes are first removed, after which, if there is a middle enlargement or projecting tumor or tumors, these can be pressed downward into the perineal wound and enucleated in the same manner. During the enucleation an assistant can aid materially by drawing the prostate down into the perineum by means of a proper pair of forceps. After the removal of all prostatic growth the bladder and the perineal wound are cleansed by suitable irrigation. A perineal tube is inserted into the bladder through the opening in the membranous urethra. A rubber drainage-tube of moderate size is placed in the bladder above the pubes. The retraction sutures are removed and the bladder is allowed

to drop back behind the pubes. The upper part of the suprapubic wound is then closed by sutures and a dressing of gauze pads applied, which is perforated to permit the drainage-tube to pass.

The perineal wound is dressed, as is usual, after perineal section. The after-treatment consists in daily washing the bladder, the fluid being injected into the suprapubic tube. The suprapubic tube is removed on the fourth day and the lower tube three days later, after which the bladder is washed by a catheter passed through the perineum. A full-sized sound is passed at the end of the second week, and every five days until the perineal opening closes. Both wounds have usually healed in the course of five weeks.

As stated, this seems to me to be the preferable operation at present in vogue, and results from it have proven fairly satisfactory; but the only objection to the method in my mind is the fact that a suprapubic opening in the bladder is left. Of course, immediate suture of the bladder might be done, but this would not be advisable, first, because it would necessitate prolonging the operation, and speed is very essential to patients of this class; and, secondly, because in most of these cases there is marked cystitis with infective urine, and immediate closure of the bladder-wound would be difficult to accomplish on that account.

My experience, and my observation of the experience of others, has led me to believe that suprapubic cystotomy as a means of drainage is a very undesirable procedure, and that it is not well borne in a great many cases in old men. Infection of the loose areolar tissue in the prevesical space is very apt to occur, giving rise to a new source of danger to the patient from general sepsis, and also materially prolonging the convalescence; and then the fact that the drainage is uphill certainly makes it less effective than drainage through the perineum, which acts in the line of natural physical forces.

I have the following modification of this operation to propose,—namely, that a laparotomy should be performed, entering the peritoneum just above the vesical fold, by an in-

cision large enough to permit the operator with one hand to press the enlarged prostate well into the perineum without opening the bladder. Then the rest of the operation should be performed in the manner already described.

With our present methods this would add but little to the shock of the operation, and, if successful, it would detract very much from the dangers following the operation, for the abdominal wound would, of course, be closed immediately, and the treatment of the case would be but little more than the treatment of any ordinary case of perineal section. The abdominal wound should close primarily, and, being small, should permit the patient to soon be gotten out of bed.

Irrigation and drainage of the bladder may be satisfactorily and easily accomplished from the perineal opening, and the ultimate convalescence of these patients should be much shorter than when the suprapubic opening exists.

As to the results of a successfully performed prostatectomy, sufficient cases are now on record to show that a great deal is thereby accomplished. Even in cases in which more or less atony of the bladder had been present, when the obstruction to urination has thus been removed, restoration has taken place, so that in many instances complete bladder-function has resulted, the patients not only controlling the urine, but also completely emptying the bladder, having no residual urine, and the frequency of urination has been diminished to or about the normal point.

Statistics of mortality, as yet, show a rather high death-rate, but there is no question that this is largely owing to the fact that the operation is, as yet, new to the general profession, and that mistake is made inasmuch as patients are not subjected to this operation sufficiently early to afford the operator and the patient the best possible chance.

If prostatectomy is a proper operation in case of enlarged prostate, which is causing obstruction, it should be resorted to as an early form of treatment, and not left as a last resort. Too often it has been the case that patients who have undergone this operation had reached the stage when not

only the bladder was badly inflamed, but where also the ureters and kidneys had been involved by the effects of obstruction to the urinary outflow and of infection from the bladder and urine.

If prostatectomy be resorted to earlier in the disease, while the patient's general condition is still good and while the bladder is not yet infected, and the ureters and the kidneys are still in a healthy condition, there is no question that the mortality from the operation will be very considerably diminished; and the evidence before us shows that a prostate, thus successfully operated upon, may be practically relieved or entirely cured of this most baneful disease.

NOTE.—Since the preparation of this paper I have learned that Dr. Alexander has twice performed this operation in thin subjects, not only without opening the bladder suprapubically, but without opening the abdomen, it having been possible in these cases to crowd one hand behind the pubes so as to push the prostate towards the perineal incision, and render it possible to operate entirely through the perineum. This certainly is preferable where it can be done.

CONTRIBUTION TO THE SURGERY OF THE KIDNEY.

A REPORT OF CASES TREATED IN THE ROOSEVELT HOSPITAL
OF NEW YORK IN THE PERIOD FROM JANUARY 1,
1890, TO OCTOBER 1, 1898.

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(Concluded from page 255.)

INTERMITTENT HYDRONEPHROSIS FROM STRICTURE OF THE URETER.—TWO CASES.

CASE I.—Ernest S., aged twenty-two years, was admitted September 14, 1896.

Previous History.—Three years ago had a sudden attack of pain in right inguinal fossa. Fell unconscious, and was in bed eight weeks with fever. Constant dull pain in the right side. Nine months ago another severe attack with hæmaturia. Pyuria painful and frequent. During urination, two weeks ago, another attack.

Physical Examination.—Well nourished; abdomen tense upon the right side; tender over right iliac fossa, and over kidney behind. Temperature, 98.8° F.; pulse, 80. Urine, alkaline; specific gravity, 1015; much albumen and pus.

Operation, by Dr. Hartley, September 18, 1896. Cut from lower border of ribs at external border of erector spinæ vertically downward, then forward to near iliac crest and parallel to Poupart's ligament, ending just above the anterior superior spine. Kidney exposed and drawn well out of wound. There is a marked dilatation of the pelvis which is at present collapsed.

Vein and artery cut between double ligatures. Ureter, patent into bladder, ligated at lowest possible point, opposite common iliac artery. Kidney removed. Suture of both ends of wound, centre packed. Stitch abscess; aseptic healing of deeper wound. Left hospital, well, October 28, 1896.

Subsequent history not obtained.

CASE II.—John F., aged fourteen years, was admitted September 8, 1894.

Previous History.—During past year had numerous attacks of abdominal pain, accompanied by nausea, vomiting, prostration, and the appearance of an abdominal tumor. These attacks have occurred at intervals of three or four weeks, and have lasted three or four days. In the intervals there had been no pain and the tumor has disappeared.

Physical Examination.—On admission, a robust lad, apparently in good health. No tumor found in the belly. After three days in the hospital a firm rounded mass, three inches in diameter and flat on percussion, could be felt in the median line below the umbilicus. Urine normal. Its quantity was increased, so the patient states, as the attacks subsided.

Operation, September 14, by Dr. Hartley. Median incision from two inches above navel to one inch above pubis. Peritoneum opened and tumor exposed. It lay behind, and was covered by the posterior layer of the peritoneum. The descending colon lay in the median line to the right of the tumor, which was evidently cystic in character. A round white cord, one-quarter of an inch in diameter, sprang from the anterior and external surface of the cyst, and passed downward and backward in the direction of the bladder, and was believed to be the ureter. The tumor was opened, and one pint of clear amber-colored fluid was evacuated. The wall of the tumor was one-eighth inch in thickness and vascular. The edges of the opening in the cyst wall were sewed to the abdominal wound, the remainder of the wound in the parietes closed with sutures. The cyst was packed with sterile gauze. The fluid contents of the cyst were found to be urine. The wound healing was normal. Urine continued to drain from the cyst in considerable quantity. In January, 1895, the greater part of the urine passed through the urethra; but that which passed through the fistula was purulent and ammoniacal. On May 8, 1895, this condition persisting, nephrectomy was done

by Dr. McBurney. A six-inch incision was made in the left linea semilunaris. The left kidney was found placed so low down in the abdomen and in the median line that this avenue of access seemed unsatisfactory and the wound was closed. On June 5 the patient was again etherized, the orifice of the fistula was circumscribed with a cut, its edges were inverted and sutured to prevent leakage during the subsequent steps. Median incision through the site of the original scar, including the line of the fistula. The adhesions between the cyst wall and the surrounding structures were separated. The kidney lay transversely at the pelvic brim with its outer convex border directed downward. The vessels entered from above; the dilated pelvis, forming the cyst, lay in front of the last lumbar vertebra. The ureter left the dilated pelvis below the fistula and passed downward in front of the pelvis and kidney to the bladder. The vessels and ureter were cut between double catgut ligatures, the ureter near the bladder and its stump cauterized. The kidney was adherent to the pelvic structures, notably the bladder, from which it was separated. The organ was markedly lobulated; the dilated pelvis had prolongations embracing each lobule. The kidney-tissues showed the lesions of chronic diffuse nephritis. The kidney weighed five ounces. The ureter was patent. Partial suture of the wound and drainage. The wound healing was aseptic, and the patient left the hospital with a sound scar and in good general health.

Subsequent History.—In September, 1898, reported himself in excellent health. No trouble since leaving the hospital.

CYSTIC DILATATION OF URETER.

CASE I.—Alfred D. O., aged thirty-five years, was admitted January 30, 1897.

Previous History.—Numerous attacks of gonorrhœa previous to present illness. In 1884, while suffering from gonorrhœa, had chordee, and an injury to the urethra in consequence, and some bleeding from the meatus. The following day chill and fever, headache, vomiting, and prostration. Two weeks after this severe pain in lumbar region, lasting ten days; later in the same year was treated for cystitis.

In 1886, for five months, weekly paroxysms of lumbar pain, during which the urine was very purulent. In 1887 received a

blow in the abdomen, followed by hæmaturia for three weeks. In 1890 sudden onset of agonizing pain in the small of the back, which continued for three days. During this attack had nausea, anorexia, and much prostration. Since then the patient has had numerous seizures of a similar nature, feeling perfectly well in the intervals. On January 25, 1897, sudden onset of severe lumbar pain, increasing in severity and radiating to abdomen. Had fever, nausea, anorexia, constipation, and abdominal distention; complete retention of urine.

Physical Examination.—Well nourished, but flabby. Great distention of abdomen with general tenderness, though more marked in the right iliac region. Abdominal walls tense under anæsthesia. There was a large, rounded, abdominal tumor reaching from the linea alba to the right anterior superior spine, its upper limit being above the navel.

Percussion.—There was a region of dulness in the right iliac fossa; otherwise tympanitic. Numerous tight urethral strictures.

Operation, January 30, 1897, by Dr. McBurney. Four-inch cut nearly parallel to Poupart's ligament, two inches internal to right anterior superior spine, and mostly below line from navel to spine. Muscles cut and peritoneum opened, exposing a large, tense, retroperitoneal, cystic tumor. The tumor extended somewhat to the left of the median line, and occupied the right side of pelvis, its upper limit could not be reached through this incision, but extended some distance above the level of the navel. Cavity of peritoneum protected by sterile gauze packing. Three-fourths-inch cut in cyst wall. Edges grasped with artery-forceps and drawn into the abdominal wound; long rubber tube introduced into the cavity and fluid allowed to drain away. In the beginning the fluid was thin, clear, and straw-colored, later thick, yellow, and purulent. Washing of cavity.

Suture of peritoneum, except three-fourths inch in the middle. Partial suture of wound. Tube left in cyst. The cyst wall was covered with congested peritoneum, beneath which were numerous dilated veins crossing the tumor. Fluid does not smell of urea. Quantity, forty-two ounces, alkaline; specific gravity, 1013; albumen abundant, thirty per cent. by volume on boiling. Pus and red blood-cells. Urea present by HNO_3 test. Temperature, 101° F.; pulse, 118.

Wound Healing.—The patient had some fever. There was some infection of the superficial wound and the large intra-abdominal cavity continued to discharge pus. On March 6, the wound having become clean and the amount of discharge considerably diminished, the patient was again etherized, and a lumbar incision was made to explore the condition of the kidney on the affected side. Palpation of the kidney showed it to be somewhat enlarged, but not evidently diseased; there appeared to be no direct communication between the kidney and the suppurating cyst. The attempt was made to trace the cavity upward to the kidney by means of a large probe, but the connection could not be made out. A small opening was made in the peritoneum, and two fingers introduced in the effort to explore the left kidney, but the left kidney could not be reached. Suture of wound with rubber drainage-tube at upper angle. Dressings of sterile gauze. A long rubber drainage-tube in old sinuses led to opposite side of abdomen.

The new operation wound healed *per primam*. The old sinus continued to discharge much pus. The patient's urine remained purulent.

After the ninth day suppuration appeared in the upper part of the new wound and a considerable abscess was opened at its upper part. The wound soon cleaned up, and he was able to leave the hospital with a tube in the old sinus, in a fairly comfortable condition, April 3, 1897.

Eight months later, December 9, 1897, he was readmitted on account of abdominal cramps, which had been troublesome during the previous month. A sinus persisted in the middle of the old scar. Urinary examination negative.

Operation, by Dr. McBurney, December 14, 1897. Sinus cleaned and packed. Four-inch median cut from navel downward, opening peritoneum. Several old adhesions binding the right side of the omentum to the colon pressing upon and partly obstructing the ileum near the ileo-cæcal valve; adhesions liberated and portions of the omentum tied off. Suture of the wound. Wound healing aseptic. Left the hospital, January 6, 1898, free from discomfort, with wound healed; old sinus as before. At present still has a sinus; general health good.

NEPHRALGIA.—TWO CASES.

CASE I.—Nelson S., aged fifty-one years, was admitted February 15, 1892.

Previous History.—Had an attack of lumbar pain twelve years ago, during which he passed bloody urine. This attack was severe, and he was unable to work for three months. Four years ago he had a similar attack on the left side, since when he has suffered from occasional pain in the lumbar region. Urination normal. Urine, specific gravity, 1024; acid; turbid; a few red and white cells.

Operation, February 15, 1892, by Dr. McBurney. An eight-inch oblique lumbar incision. Exploration of kidney and its pelvis, with finger and needle. No stone found.

Wound healing *per primam*. He left the hospital March 20, with no pain.

Subsequent History.—In 1898 he described himself a physical wreck. Has never done a day's work since he left hospital. Complains of pain in the scar and cloudy urine during cold and damp weather. Is constantly taking kidney medicine. Symptoms as described resemble hypochondriasis.

CASE II.—John H., aged thirty-six years, was admitted June 24, 1898.

Previous History.—Had several attacks of gonorrhœa. One year ago had sudden, sharp pain in right lumbar region radiating downward to groin and right testis, and also in end of penis and down right leg. This attack lasted ten days. Urination frequent during attack, but not painful. After six months another attack, lasting six hours; since this attack numerous others, lasting from one hour to several hours. Patient states that after each attack he passed small, hard, greenish masses *per urethram*, also says that his urine was cloudy.

Physical Examination.—Robust individual. Tender on pressure over right kidney and right iliac region. Temperature 99° F.; pulse, 88. Urine, acid; specific gravity, 1026; albumen, moderate amount; abundant pus.

The patient was kept under observation until July 15, during which period his urine was continually purulent, and occasionally contained a good deal of albumen and red blood-cells. He also had one severe attack of renal colic.

Operation, by Dr. Abbe, July 15, 1898. Incision from costal border, in midaxillary line, downward and forward to a point one inch above the anterior superior spine of the right ilium. Muscular wall of belly split in the direction of the fibres of the several muscles, and kidney exposed. Pelvis of kidney incised, and ureter and pelvis searched for stone without result. Wound sutured, except a narrow canal down to kidney, which was packed with sterile gauze.

Subsequent History.—The wound soon closed down to a sinus, which still remains unhealed, October, 1898, and discharges some pus. Patient returned every second day to the Out-Patient Department for dressing. His urine is still slightly purulent. He has had no severe attacks of pain. His general condition is fair.

TUMORS OF THE KIDNEY.

The cases of tumor of the kidney numbered six, three males and three females. The ages of these averaged thirty-four years. The oldest was fifty-five and the youngest was two and a half years. There were three cases of carcinoma, two cases of sarcoma, and one of teratoma, growing probably from a suprarenal rest. Symptoms of kidney trouble had been present, on an average, for a year and a half. In one case the symptoms followed an injury to the loin. In all cases the tumor was large; in one case very large. In every case there was a history of pain in the lumbar region. In two cases the pain began in attacks resembling renal colic. In two cases the urination was frequent and painful. In three cases the urine was albuminous and purulent. In one case hæmaturia had occurred. In two cases the general health had suffered severely. In four cases transperitoneal nephrectomy was done. In two cases a lumbar incision was used; in one of these the tumor was not removed, on account of dense adhesions and infiltration of the neighboring organs. In two of the cases in which the tumor was removed a secondary involvement of other organs was present at the time of operation. In one case the liver, in another the ascending colon, was adherent to the tumor, and itself infiltrated

with the disease. Of the five cases in which the tumor was removed, three died of shock soon after the operation, two recovered, but died about three months later of recurrences.

TERATOMA OF THE KIDNEY: SUPRARENAL REST.—ONE CASE.

CASE I.—Thom. B., aged ten years, was admitted April 10, 1894.

Previous History.—Ten months since was struck by a baseball below the border of the ribs, on the right side. Soon after this he began to have attacks of pain in the right lumbar region, and began to lose flesh. Three months after the injury his mother noticed that his abdomen was growing larger, and after five months she noticed the presence of a distinct tumor. At this time he began to suffer from frequent vomiting; severe, continuous pain of the abdomen, and he became markedly emaciated; urination and urine said to have been normal.

Physical Examination.—Pale emaciated boy. There was general abdominal enlargement, more marked on the right side. A rounded nodular mass was noticeable in the median line below the umbilicus, its diameter being four inches. The abdominal cutaneous veins were dilated. A large tumor extended from beneath the ribs downward nearly to the level of Poupart's ligament upon the right side. The lower border of the tumor could be easily felt at that point. The tumor was flat on percussion. The flatness extended across the median line to the mammary line and downward to within three inches of the left anterior superior spine of the ilium. The right lumbar region bulged markedly, and the right flank felt tense and cystic. The anterior surface was nodular and hard, the smaller rounded mass could be moved independently of the main tumor. The tumor did not move during respiration. Urine normal.

Operation, April 14, 1894, by Dr. McBurney. Transperitoneal nephrectomy. Oblique incision from below the twelfth rib downward and forward to a point one and one-half inches below the umbilicus. The transverse colon lay across the front of the growth, from which it could not be cleanly separated. The rest of the tumor was enucleated without especial difficulty. The vein, artery, and ureter were clamped and clamps left *in situ*. The lower half of the wound sutured; packing above; intravenous salt infusion.

Pathological Report.—The tumor was of globular shape. Dimensions: weight nine and three-quarters pounds. Circumference in three planes, twenty-five and one-half, twenty-seven, and twenty-three and one-half inches. The tumor was distinctly encapsulated; its surface was smooth, except for two hemispherical projections, which were of softer consistence. From the lower end of the tumor there projected a pedunculated mass measuring four by three by two inches, with a pedicle two and one-half inches wide and one-half inch thick. This mass was of firm consistence, and upon it the colon lay and to it it was adherent. On section the surface was smooth and dotted with irregular areas of necrosis. The tissue was soft and friable. At the upper and back part of the tumor lay the kidney, apparently merged at its lower pole into the mass. On section the kidney was normal; there was a sharp line of demarcation between it and the tumor.

Microscopical Diagnosis.—Myo-chondro-adenocarcinoma,—teratoma.

Wound Healing.—Wound remained clean until the twelfth day, when fæcal fistula formed. Urine was abundant. Second fæcal fistula was noticed on the sixteenth day. He gained flesh and strength, however, and was able to sit up on the sixteenth day. The wound was greatly diminished in size. At the end of four weeks he began to have pain in the abdomen and to lose ground. The pain and swelling in the left side of the abdomen gradually increased, and at the end of seven weeks a tumor could be felt in his epigastric region, extending downward to the umbilicus. This tumor was situated to the right of the median line. The wound continued to diminish in size; the fæcal fistula did not close. He developed dyspnoea and thoracic respiration, and died from exhaustion about the middle of July, about three months after the operation. No autopsy.

CARCINOMA OF THE KIDNEY.—THREE CASES.

CASE I.—Catherine D., aged fifty-two years, was admitted March 14, 1891.

Present Illness.—There was a large, nodular, hard tumor occupying the right side of the abdomen, extending upward beneath the ribs and downward to the iliac crest, and inward as far as the median line. The tumor was slightly movable. There was a his-

tory of pain in the right lumbar region and hæmaturia; tumor first noticed two months ago. Urine, specific gravity, 1020; acid; much albumen; pus; blood; granular and hyaline casts.

Operation, by Dr. McBurney, March 21, 1891. Transperitoneal nephrectomy. Incision beginning on the outer border of the right rectus, and extending downward from the free border of the ribs, convex outwardly, ending a short distance in front of the anterior superior spine of the ilium. Peritoneum opened and tumor exposed. Many large veins on its surface; enucleation difficult; ligature of pedicle *en masse*, with silk. Tumor cut away. Subsequent ligation of pedicle and vessels with catgut. Sutures and packing. Intravenous salt infusion. Death on the second day.

Pathological Report.—Left kidney seat of chronic diffuse nephritis. Tumor carcinoma.

CASE II.—Mary C., aged fifty-five years, was admitted December 16, 1897.

Present Illness.—During the past five years had suffered from pain in the left lumbar region. The pain at first came on in attacks, lasting three or four days. No vomiting nor hæmaturia. For the past two years the pain had been constant and of a dull aching character, not severe enough to interfere with her work. During the past six weeks has had frequent and painful urination and constant pain over the bladder. Urine has recently been cloudy and of a bad odor. She has lost flesh and strength and has had night-sweats.

Physical Examination.—The patient was not emaciated. There was a large, smooth tumor in the left side of the abdomen, extending from the ribs to the iliac crest. It felt solid and was immovable; dull on percussion in the loin; tympanitic in front; not tender. There was a small movable tumor attached to the lower end of the large tumor. Temperature, 99° F.; pulse, 100. Urine, alkaline, purulent, cloudy; many streptococci; no tubercle bacilli. No improvement in bladder after four weeks' daily washing. Operation, January 14, 1898, by Dr. McBurney. Six-inch oblique lumbar incision. Exposure of the tumor showed that on account of firm adhesions to surrounding organs its removal was impracticable. Closure of the wound.

Wound healing aseptic. Patient left the hospital, unimproved, February 16, 1898.

CASE III.—Henry G., aged thirty-six years, was admitted March 3, 1898.

Previous History.—For the past year patient has had a dull pain in the right loin; three months later he noticed the presence of a tumor in the right loin and hypochondrium, which has steadily increased in size. Urine contained a few pus cells, otherwise normal. The right side of the abdomen is occupied by a large, firm tumor, immovable, flat on percussion, extending from beneath the ribs downward to the iliac fossa and inward to median line. General health fair.

Operation, March 3, 1898, by Dr. McBurney. Six-inch oblique incision, beginning at the margin of the right rectus muscle one and one-half inches below the ribs, extending outward parallel to the ribs. Peritoneum opened. Large tumor, occupying the right side of the abdomen, extending from the liver to the crest of the ilium and to the median line, exposed. It was encapsulated. In order to deliver the tumor a second incision, three and one-half inches in length, was made, bisecting the first, parallel to Poupart's ligament, three and one-half inches in length. During the enucleation the renal vein was torn, clamped, and tied. Ligature of artery and ureter separately with catgut. Under the posterior part of the lower surface of the liver there was a necrotic mass of tissue which seemed to be a secondary growth. It was as far as possible removed. The wound was closed, except the posterior half of the horizontal portion. Tumor measured eight by three and one-half by three inches. It was reniform, very vascular, hard and soft in spots. On section, carcinoma, showing various forms of degeneration; purulent, fatty, cheesy, necrotic, mucoid.

Pathological Report.—Adenocarcinoma, growing from a suprarenal rest. Wound healing clean. He left the hospital on April 6, 1898, the wound still open, though small, somewhat improved in general health. He died about three months later from a recurrence.

SARCOMA OF THE KIDNEY.—TWO CASES.

CASE I.—Lillian V., aged two and a half years, was admitted June 26, 1895.

Previous History.—Child was ailing for several months. Had

pain in the belly. Two days ago mother noticed a lump on the right side of the abdomen.

Physical Examination.—There was a large mass occupying the right lumbar and iliac regions. The tumor was movable, tender, and flat on percussion. Colon not discovered in front. Urine negative; moderate fever.

Operation, by Dr. Hartley, June 28, 1895. Incision along the anterior border of the erector spinæ muscle, convex downward to the external border of the rectus just above the navel. On opening the peritoneum a large tumor was exposed, with the colon in front of it and displaced towards the median line; enucleation with separate catgut ligatures of the elements of the pedicle. Death from shock on the same day.

Pathological Report.—Kidney much enlarged and nodular; the tumor was soft and capsule adherent. No normal parenchyma. It is composed of soft, white tissue into which multiple hæmorrhages have occurred. Round-celled sarcoma.

CASE II.—Pat. G., aged thirty-four years, was admitted August 12, 1892.

Previous History.—For the past two years had intermittent attacks of pain in the right loin. He has lost flesh and strength, and of late has had fever and night-sweats. He suffered from frequent and painful urination. Urine cloudy, amber, acid; specific gravity 1009; much pus; granular casts and granular matter.

Physical Examination.—The patient was pale and moderately emaciated. The right lumbar region, right hypochondrium, and the upper part of the right iliac region were occupied by a smooth, elastic swelling, dull on percussion, giving the feeling of resistance like a tense cyst. The mass was moderately tender.

Operation, August 12, 1892, by Dr. Johnson. Four-inch lumbar incision exposing the kidney, uncovering a tumor of large size, of apparently semisolid and cystic character. The aspirating needle drew a chocolate-colored, thick fluid. The incision was enlarged forward and downward to the extent of nine inches. The peritoneum was stripped from the inner side of the growth and all adhesions separated with the fingers. The ureter was ligated and cut between silk ligatures. The vessels were clamped. On account of its great size the tumor was cut in two and removed in two portions. The loss of blood was slight. Wound

sutured partly and packed. Severe shock. Death the following day from shock, with a high temperature.

Pathological Report.—Tumor measured nine by five by four inches; preserved the shape of the kidney. Normal kidney-tissue was absent. The mass consisted of a soft, grayish-white tissue, containing many cysts, some of them as large as a hen's egg, filled with clear and chocolate-colored fluid.

Diagnosis.—Cystosarcoma.

GENERAL CONSIDERATIONS.

A number of interesting considerations are suggested to the writer by the facts embodied in this report. Among them the choice of operative methods in approaching the kidney for purposes of exploration or removal. A comparison of the percentages of mortality following transperitoneal and extraperitoneal nephrectomy shows that by the former method sixteen cases were operated upon with five deaths as the immediate sequence of the operation,—a mortality of $31\frac{1}{4}$ per cent. By the latter, sixteen cases were operated upon with one death,—a mortality of $6\frac{1}{4}$ per cent. And yet, if we examine the cases of transperitoneal nephrectomy which ended fatally, we find that they were cases in which a fatal result was probable under any form of operation. Case II—subcutaneous rupture of the kidney—was exsanguinated when his kidney was removed, and would no doubt have succumbed to a lumbar nephrectomy.

Case I—of the pyonephroses (see page 220)—was in a desperate state at the time of operation. Two former operations for drainage of his suppurating kidney had failed to prevent the occurrence of a grave septicæmia. As a last resort the kidney was removed, and adhesions to the vena cava, diaphragm, and peritoneum rendered the opening of the cavity of the belly unavoidable. He died of shock.

In Case VI—of the tubercular cases (see page 233)—the remaining kidney was without function, and any form of nephrectomy must have been fatal.

Case I—carcinoma of the kidney (see page 328)—

was an elderly woman with chronic diffuse nephritis, and would hardly have survived under any circumstances.

Case I—of the sarcomata (see page 330)—was a child two and a half years old, with a large sarcoma of the kidney, who died of shock on the day of the operation. It does not seem probable that an extraperitoneal operation would have proved more successful in this case, although it is, of course, possible.

In the more favorable cases, in tuberculosis and even in the cases of abscess, in which the perirenal tissues were not involved, and even in two cases of tumor of great size, the immediate results were good. In the cases of these very large tumors the intraperitoneal route was the only practicable one.

One of the advantages certainly possessed by this method is the facility with which the other kidney may be felt and its condition determined. In several instances, however, this advantage was obtained in other ways,—namely, by a separate incision of small size through the opposite side of the abdomen, through which palpation of the kidney was made and the wound closed.

In other cases the incision was commenced in the semi-lunar line just below the ribs and carried vertically downward a distance of three inches or less, then curved outward and backward into the loin parallel to the ribs. The peritoneum was opened throughout the vertical part of the incision, and through this opening both kidneys were examined. The operator then had his choice of sewing up the wound in the peritoneum and removing the kidney outside the belly cavity or of increasing the opening in the peritoneum to any desired extent and doing an intraperitoneal nephrectomy. Through such an incision a considerable portion of the ureter was sometimes removed.

The incision of König offers abundantly free access to the kidney and also to almost the whole of the ureter, and by means of this cut nearly the entire ureter may be removed, and that without greatly increasing shock. It ap-

appears to the writer that in cases of tuberculosis of the kidney and ureter, and in some cases of chronic suppuration, this is an advantage of great value.

Several of the cases of tuberculosis mentioned in this report, in which nephrectomy was done, but in all of which a considerable portion of diseased ureter was left behind, although in fair health after several years, still complain variously of hæmaturia, cystitis, painful and frequent urination, and other symptoms, which may be due to a tuberculous lesion of the remaining kidney or of the bladder. Might not the results have been more complete had the ureter been removed in its entirety, either primarily or as a secondary operation? The muscle splitting operation in the loin does not afford space for the same freedom of manipulation as do cuts made in the ordinary manner. Drainage, when that is required, is certainly less free, and the ureter, except for a small part of its extent, is inaccessible. It is unsuited to cases in which extensive perirenal adhesions are present, and such conditions cannot always be foreseen.

The rare occurrence of hernia after kidney operations in the loin renders its superiority in this particular of less value. As far as the writer has been able to learn, no case of hernia has occurred after the lumbar nephrectomies mentioned in this report. The several operators, whose work forms the subject-matter of this report, have shown a preference for incisions of somewhat varied character. Dr. Charles McBurney has frequently used, in both intra- and extraperitoneal nephrectomies, an incision of which the following description may serve as an example: A vertical cut two and one-half inches in length just external to the semilunar line, beginning just below the ribs and carried through the peritoneum. Palpation of both kidneys through this wound. Incision then carried outward and backward, parallel to the costal border, as far as the external border of erector spinæ. The subsequent steps were, in cases where extraperitoneal nephrectomy seemed to be indicated, suture of the peritoneal wound and stripping of the peritoneum from the posterior

abdominal wall, thus exposing the front of the kidney. In intraperitoneal cases the opening in the peritoneum was increased to any desired extent outward and backward. When the tumor was large this incision was sometimes joined at its inner end by a vertical cut downward and of variable length. In cases of very large tumors of the kidney the incision was commenced in the semilunar line and carried vertically downward or downward and outward or inward over the most prominent part of the tumor. In a number of cases of extraperitoneal nephrectomy an incision one-half inch below the costal border and parallel to it was used, beginning at the outer edge of erector spinæ and extending forward a variable distance.

The incisions used for exposing movable kidneys began at the border of the erector spinæ, below the last rib, and were carried obliquely downward and forward a distance of four or more inches, according to the thickness of the abdominal wall. The incisions used by Dr. Frank Hartley were usually that of König or a modification of it, in which the anterior portion of the cut turned upward in a curve, in the direction of the umbilicus, instead of following the crest of the ilium. König's entire incision was used when the intention was to expose the kidney and ureter. The modified cut when the kidney alone was to be exposed. The posterior half of König's cut was used in certain cases when a larger opening was not required. Langenbuch's incision was also used.

Dr. Robert Abbe has used an oblique lumbar cut, downward and forward, from just below the last rib, at the external border of the erector spinæ. A cut parallel to the ribs, as already described, and an incision made without division of the muscles, as follows: A four-and-a-half-inch cut parallel to the crest of the ilium, two and a half inches above it. Its centre opposite the midaxillary line. Muscles separated by blunt dissection without division of the fibres. Peritoneum stripped away from the front of the kidney and organ enucleated.

The writer has used an incision parallel to the ribs,—the incision before described as that for which Dr. McBurney has shown a preference. And in one case of a very large malignant growth this incision was further increased by a vertical cut in the semilunar line. The methods of treating the pedicle in these cases were as follows: When practicable, the artery, vein, and ureter were isolated, and the artery and vein were ligated with heavy catgut (not chromicized). The method of treating the ureter varied. In non-infected cases it was often simply ligated with catgut, its stump cauterized and dropped back into the wound. When infected it was ligated and cut close to the kidney. The stump was then cauterized in its interior with the Paquelin point, ligated with catgut, again cauterized, and stitched into the lower or posterior angle of the wound as near the skin as possible. In some of the later cases the stump has been cauterized, inverted like the stump of an appendix, and closed by a purse-string suture, and dropped back into the wound.

Except in a few cases no special effort has been made to extirpate the ureter. It has sometimes been severed at a distance of two or three inches below the kidney. The lowest point at which it was cut was at the level of the common iliac, and at so low a point only in one case.

In those cases in which isolation of the elements of the pedicle was impracticable, the pedicle was surrounded by a heavy catgut ligature, the kidney cut away, and the elements of the pedicle were then ligated with catgut separately. In several cases heavy clamps were used upon the vessels and left *in situ*. Occasionally the stump of the ureter was treated in the same manner. The clamps were removed at the end of two or three days. In none of the cases of nephrectomy recorded in this report did hæmorrhage follow after operation as the result of slipping, cutting through, or premature softening of a catgut ligature; and this method of treating the pedicle has been the rule, the use of clamps the exception. Silk ligatures have been used on the pedicle in a few cases. All the nephrectomy wounds were treated by partial

suture and by packing the interval left with sterile gauze. Iodoform gauze was occasionally used on the stump of the ureter.

In a considerable number of the cases of nephrectomy, in all, in fact, where symptoms of shock were evident and in several where shock was expected, a hot sterile intravenous salt infusion was administered either during the operation or soon afterwards. In general the results were excellent. The vein most prominent at the bend of the arm was usually selected as the site of the infusion. Similar infusions were also used where the function of the remaining kidney seemed to be impaired during the days following the operation, usually with the result of increasing the amount of urine passed.

In considering the histories of the cases of suppurative nephritis and pyonephrosis, the writer was struck by the fact that, while in at least four of these cases no cause could be assigned for the suppurative lesion, their histories would correspond very well with the occurrence of an intense pyogenic infection in kidneys already the seat of tuberculosis, and in which the suppurative process had masked or completely destroyed the tuberculous lesions. Two of the cases of undoubted tuberculosis lend some support to this view,—viz., Case IX, abscess of kidney, page 35, January No., 1899. In another case there had been a sense of discomfort in the left lumbar region of several years' duration, but no pain except from ardor urinæ. Six weeks before admission patient was taken severely ill, a chill followed by fever, prostration, severe pain in the left side of the abdomen, and very marked pyuria. At times almost pure pus was passed. The left kidney was incised and a large amount of stinking pus was evacuated, in which none of the characters of tuberculous pus were recognizable. Three months later the kidney was removed. The organ was almost entirely destroyed by suppuration, but distinct evidences of tuberculosis were present in the walls of the pus-cavities.

Ureteral catheterization has been used in a number of

the later cases, in which the seat of the lesion seemed doubtful; the results were in general satisfactory. The cystoscope has been also used, but not systematically. When indicated the examination has usually been made by a specialist, not a member of the hospital staff. Five cases presented symptoms which seemed to point to a kidney lesion of such character as rendered operation advisable, but exploration failed to show the presence of stone, tumor, tuberculosis, or suppurative lesion. The indications for operation were, in all five, such as would render the diagnosis of stone or a beginning tuberculosis, or tumor, exceedingly probable. In one case, indeed, a patient had actually passed calculi on several occasions. All of these patients had had well-marked attacks of renal colic. Three had suffered from hæmaturia, and in two pyuria was present. In all hæmophilia, vasomotor disturbance, and violent muscular effort could be excluded. To the writer it seems that the patient who had passed calculi may still be regarded as a case of nephrolithiasis. Be that as it may, he has had no recurrence of his symptoms since the operation.

The study of another of these cases, still under observation, leads the writer to believe that the attacks of renal colic were due to obstruction of the ureter by more or less hardened plugs of muco-pus, which the patient actually passed from time to time after his attacks of pain. He had an undoubted pyelitis, probably of gonorrhœal origin. His pain has not recurred since operation.

Of the three remaining cases characteristic attacks of renal colic, followed by hæmaturia, had occurred in one; his urine on admission being normal. Exploration of the kidney revealed nothing; but he has since remained in good health, for a period of two years.

The next case is almost identical with the one just outlined. The patient remains well, a year after operation. The fifth case suffered from a renal colic and severe hæmaturia. Nothing was found in his kidney, and the patient, after six years, still complains of renal pains and describes

himself "as far from well." The hæmaturia has not recurred, and his written statement of his own condition is suggestive of hypochondriasis.

ANALYTICAL TABLES OF FATAL CASES.

I. NEPHIRECTOMIES.

	Number of Operations.	Recovered.	Deaths.	Percentage of Mortality.
Injury	3	2	1	33 $\frac{1}{3}$
Abscess, suppurative nephritis . .	5	5	0	0
Pyonephrosis	3	2	1	33 $\frac{1}{3}$
Tuberculosis	8	7	1	12 $\frac{1}{2}$
Nephrolithiasis	1	1	0	0
Stricture of the ureter	1	1	0	0
Intermittent hydronephrosis . . .	1	1	0	0
Cystic degeneration of the kidney .	5	5	0	0
Tumors of the kidney	5	2	3	60
Total	32	26	6	18 $\frac{3}{4}$

II. NEPHROTOMIES.

	Cases	Recovered.	Deaths.	Percentage of Mortality.
Injury	4	4	0	0
Movable kidney	15	15	0	0
Perinephritic abscess incision . .	3	3	0	0
Abscess, suppurative nephritis . .	7	7	0	0
Pyonephrosis	6	3	3	50
Pyelonephritis, double, exploration	1	0	1	100
Tuberculosis	1	1	0	0
Nephrolithiasis	11	10	1	9 $\frac{1}{10}$
Renal colic, exploratory incision .	2	2	0	0
Pyoureter, incision	1	1	0	0
Cystic kidney, incision	2	0	2	100
Tumors, exploratory incision . .	1	1	0	0
Total	54	47	7	13 $\frac{1}{5}$

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, November 9, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

FRACTURE OF THE CERVICAL VERTEBRA, WITH PARALYSIS OF THE ELEVENTH NERVE.

DR. ROBERT H. M. DAWBARN presented a man, fifty years old, who, on the 1st of July, 1898, fell from a height of about ten feet, striking on his head and shoulder. The accident was severe enough to render him unconscious for some hours and confined him to bed for six weeks. On getting up it was noticed that his head was inclined towards the left side, and was extended on the neck, with the chin deviated towards his right. This condition still exists. There is also a mass situated beneath the sterno-cleido-mastoid muscle on the right side, which was not there before the receipt of the injury. Dr. Dawbarn said he did not know whether this mass consisted of callus or of inflammatory products, or both; since the man had been under his observation it had slightly decreased in size.

The speaker said he attributed the abnormal position of the patient's head to a paralysis of the right sterno-cleido-mastoid muscle, induced by a rupture of the eleventh cranial or of the second or third cervical nerves, that muscle being supplied by one or the other of those nerves, or by all.

There is no degree of hemiplegia, nor has there been.

An examination of the man's spinal column shows a depression at the back about the level of the third and fourth cervical vertebræ; and by inserting a finger in the pharynx an abnormal bony prominence can be distinctly felt.

Dr. Dawbarn said that, while he was not positive regarding the diagnosis in this case, he was of the opinion that he had to deal with either a forward dislocation alone, or a dislocation with

fracture of one or two of the upper cervical vertebræ. Regarding treatment, his own view was that too great a length of time had elapsed before the case was sent to him, and the nature of it recognized, to justify interference by attempting reduction.

(The president appointed Drs. Briddon and Johnson a committee to examine the patient, which they did, agreeing with the above diagnosis, and advising against surgical interference.)

DR. C. K. BRIDDON, after examining the man's throat, expressed the opinion that the bony mass in the pharynx, situated to the right of the median line, had the configuration of one of the anterior tubercles on the transverse processes. He regarded the case as one of dislocation, probably associated with fracture of one of the cervical vertebræ, with involvement of the nerve supplying the sterno-cleido-mastoid and trapezius muscles.

DR. ALEXANDER B. JOHNSON said he regarded the prominence in the throat as the body of the vertebræ, which had been projected forward. If the entire vertebræ was dislocated, it would certainly seem that there ought to be more paralysis than existed in this case. The mass on the side of the neck, underneath the right sterno-mastoid muscle, seemed to be caused by the tubercles of the transverse process.

DR. ARTHUR L. FISK said that he desired to call the attention of the society to the paper of Dr. George L. Walton, on "Reduction of Cervical Dislocation," which was published in the *Boston Medical and Surgical Journal* of December 7, 1893. The characteristic symptoms of this form of dislocation, as Walton describes them, correspond exactly with those which the case of Dr. Dawbarn shows. Dr. Fisk thought, therefore, that this was probably a case of cervical dislocation, which might be reduced by bending the head diagonally backward to the opposite side, then rotating it into position, under ether.

DR. DAWBARN said the injury in this case was considerably below the atlas and axis; it was probably as low down as the third or fourth cervical vertebra. Furthermore, he doubted the wisdom of forcible reduction in a case where the injury had occurred so long ago.

DR. BRIDDON said that, in his opinion, any operative procedure for reducing a fracture of the cervical vertebra was utterly unjustifiable after the bone had become fixed, as in this case.

OPERATION FOR CANCER OF THE PENIS.

DR. C. K. BRIDDON presented a man, fifty-three years of age, who was admitted to the Presbyterian Hospital, June 29, 1898, on account of a new growth, which involved the prepuce, glans penis, and the corpora cavernosa for two inches. Its base was indurated, its surface ulcerated, and covered with proliferating papillæ, which discharged a yellowish serum. He had no difficulty in micturition. The right inguinal glands were considerably and the left slightly enlarged.

An incision, four inches long, was made in the right groin and along Poupart's ligament. The skin covering the inguinal lymph-nodes was then reflected upward and downward to a point below the saphenous opening, and all the connective tissue dissected out, thus thoroughly removing the glands and periglandular tissues without cutting into them at any point. The same course was pursued in the left groin, where the nodes were only slightly, if at all, larger than normal, both incisions being then closed with fine black silk and dressed.

A median incision was then made, beginning one-half inch above the root of the penis, and dividing to encircle its base, it was continued backward in the median raphe of the scrotum, which was held by two assistants, and along the perineum to just in front of the anus. The scrotum was split along its median septum and each half reflected. The corpus spongiosum was exposed, separated at its posterior part from the surrounding tissues, and cut across at a point so chosen that its cut end could be brought easily into the posterior angle of the wound in the perineum. The penis was now turned downward and its suspensory ligament was divided. The crura were divided at their attachments to the ischia, some little difficulty being experienced in checking the resulting hæmorrhage.

The urethral stump was now split for half an inch in the antero-posterior plane, and the mucous membrane of each half was sewed to the cut edge of the skin of the perineum on the corresponding side of the incision by two or three fine silk sutures. The median wound was closed along its whole length by catgut and fine silk sutures. To avoid soiling the fresh surfaces by urine, a rubber catheter was left in the bladder, secured in place by a suture through the cut edge of the skin just in front of the urethral opening.

The wound in the perineo-scrotal region healed *per primam*, except in the posterior angle, the one in the right groin by granulation; there being no obstacle to the exit of urine by the perineum; and now, four months after the operation, the parts involved are apparently sound.

DR. B. FARQUHAR CURTIS said he had done this operation two or three times. In one instance he had modified it by leaving a portion of the urethra and attaching it to the anterior part of the scrotum, thus forming a funnel which enabled the patient to urinate in the erect position. It was only necessary to pass the hand underneath the scrotum and hold it up.

Dr. Curtis said that in his cases the men had absolutely refused to have the testes removed: even patients well advanced in years wished to retain them. The speaker said he had never urged their removal, as their presence had no bearing on the possibility of recurrence of the malignant disease. One of his patients died a year after the operation of a secondary deposit in the lung, without any local recurrence. Another patient was lost sight of; his remaining cases were operated on so recently that the ultimate result was still in doubt.

DR. BRIDDON said that, as the corpus spongiosum was usually involved in these cases, the more we remove of the urethra the better. The speaker said he doubted very much that an effective funnel could be made by leaving a larger portion of the urethra, through which the patient could urinate in an erect posture without wetting himself. He thought it was better to have the patient assume a squatting position when emptying his bladder, as in his case, and make the removal as complete as possible, thus lessening the danger of recurrence.

DR. CURTIS said he would not leave any portion of the urethra in a case where the disease seemed to be travelling in the direction of the corpus spongiosum, but only in those cases where it was confined to the outer layers of the penis or to the corpora cavernosa.

SIMPLE COMMUNUTED FRACTURE AND DISLOCATION OF THE ASTRAGALUS; REMOVAL OF ASTRAGALUS.

DR. L. W. HOTCHKISS presented a boy, thirteen years old, who, on July 24th last, fell from a four-story house, his fall being

somewhat broken by striking a clothes-line in his descent. He was brought to the Bellevue Hospital with his right foot in a position of abduction, partial extension, and outward rotation. The astragalus was dislocated forward and outward; there was extensive subcutaneous hæmorrhage, and the whole joint was much swollen and contused.

As it was found impossible to reduce the dislocation by manipulation under ether, an external curved incision, as proposed by Lauenstein for removal of the astragalus, was made, and the joint exposed. It was then ascertained that the dislocated astragalus consisted of a number of fragments which could not be reduced, and that the point of the internal malleolus was also broken off. This was removed, together with the entire astragalus. The articular surfaces of the lower end of tibia and fibula were left, as was the entire external malleolus. On account of the badly contused condition of the parts the wound was left open. The foot was held in a position of right-angled flexion, and a plaster splint applied.

The patient was discharged from the hospital on August 11, and became an out-patient. The result of the operation was satisfactory in every respect. The position of the foot is good. There is no deformity. There is flexion and extension through a limited arc at the new joint, and this mobility is improving under use. The patient walks squarely on the sole.

DOUBLE CONGENITAL INGUINAL HERNIA.

DR. ALEXANDER B. JOHNSON presented a young man, twenty years of age, who had presented himself at the Roosevelt Hospital, about a month ago, with the history of having noticed, from time to time, the presence of a reducible tumor in both groins. He had been wearing a truss at intervals for about a year, but as this did not prove satisfactory, he asked for an operation.

Three weeks ago the Bassini operation was done on both sides. In spite of the fact that the belly wall was apparently well developed, the operation showed a double congenital hernia, which is more or less of a surgical rarity. The sac on the left side was occupied by a piece of omentum of moderate size; that on the right side was empty. The double operation presented no difficulties; the peritoneal sac was opened down to the testes



Congenital dislocation of both knees.

and readily separated from the cord. The sac on the left side was ligated; that on the opposite side could not be ligated. On account of the density of the adhesions to the cord it was torn, and was therefore closed by suture.

The belly seemed remarkably firm at the site of the operations.

DR. McCOSH said he had operated on a similar case about three years ago. On one side he did the Halsted operation and on the other the Bassini. He had recently seen this patient, and the result on each side was satisfactory.

DR. B. B. GALLAUDET said he had a case of double congenital hernia under his observation at the present time. The patient was a boy, ten years old. He had operated on one side ten days ago, and on the other about a week later.

CONGENITAL DISLOCATION OF BOTH KNEE-JOINTS.

DR. CHARLES N. DOWD presented a child of five years with congenital dislocation of both knee-joints. This condition, the speaker said, was rare. In 1888 Carl Schmidt, in making a *résumé* of the subject, was able to collect twenty-three cases. Up to 1893 Spörri had records and references to fifty-four cases, of whom twenty were in both knees and thirty-four in only one knee. With the exception of a single case, mentioned by Müller, the dislocation of the tibia has been forward, the leg bending forward on the thigh, and in rare instances bending so far as to permit the toes to rest on the thigh. On examination the condyles of the femur may be felt beneath the skin and are almost normal. The tibia is also normal. The patella in this case is absent. In some of the recorded cases it has been normal; in some it has been displaced sidewise; in some it has been atrophic. In this patient, on the right side the dislocation can be easily reduced, but it quickly recurs on removing the pressure. On the left side, it is reduced with more difficulty and also quickly recurs, action of the quadriceps extensor being to throw the tibia upward and forward. Flexion at the knee-joint, after the parts have been reduced, is almost impossible. Free extension takes place. (See illustration.)

The theory for the causation of this deformity, which has been advocated by Müller and has received acceptance, is that

on account of the deficiency of liquor amnii, the legs become extended against the trunk and cannot be flexed again, and the continual movements of the child produce first a subluxation and then a luxation.

The treatment of this condition is to reduce the dislocation and put the legs in plaster immediately after birth. The maintaining of the position for eight to fourteen days is said to be sufficient in most instances. Where the condition has persisted for years, as in this case, some form of operation may be necessary. Plaster has been carefully tried for a long period in this instance. The tendon of the quadriceps extensor has been cut by Owen. Wolf has chiselled the tuberosities of the tibia, maintaining the position with nails and sutures for four weeks.

DR. V. P. GIBNEY called attention to the deformity of the feet in the case shown by Dr. Dowd. The speaker said he had seen about four or five of these cases, and in every instance the deformity of the feet was present, together with an attenuated condition of the hands, the thenar and hypothenar eminences being atrophied, and fingers claw-like, combined with general reversional development. Some years ago, when he presented his cases at a meeting of the Practitioners' Society, Dr. Abbe suggested the very appropriate name of "walrus-fins" to describe the characteristic appearance of the hands.

Dr. Gibney said that in all the cases he had observed there was a rudimentary patella, which did not appear for several years after birth. In the case shown by Dr. Dowd there was a small, cartilaginous body in the tendon, which will eventually become bony. Many surgeons, on first seeing these patients, are positive that the patella is absent. The speaker said he now had a case under his observation where there was complete dislocation of the knee, and at the same time a congenital dislocation of the hip.

As regards treatment, the bones can easily be held in position by flexing the knees and retaining them so flexed in plaster of Paris: the flexion should be only moderate at first, and the angle gradually increased. One of his cases was completely relieved by this treatment. The feet of these patients are usually in the position of equino-varus, with a rudimentary heel. There is also extreme arching of the sole of the foot. The whole condition of these patients points to reversion to primitive types,

and the theory quoted by Dr. Dowd, that the dislocation of the knees was due to the fact that the children were unable to completely flex the legs on the thighs on account of a deficiency of liquor amnii, would hardly explain the concomitant abnormalities.

DR. DOWD said that the subject of the causation of these abnormalities was now being investigated with much care, and one hesitated to advocate any particular theory until the question was more definitely settled. Amniotic bands surely did exist in some instances, particularly where there was a deficiency of amniotic fluid, and these bands produced a mechanical obstruction to growth, and thoroughly explain some deformities. Biologists have been successful in producing monstrosities by the mechanical injury of the ovum and the consequent obstruction to its growth.

DISLOCATION OF THE ELBOW OF TWO MONTHS' DURATION; REDUCTION UNDER ETHER, WITHOUT OPERATION.

DR. ARTHUR L. FISK presented a woman, aged forty years, who, on the twenty-second of July, in stepping from a chair up onto a table, slipped and fell backward, striking upon her left elbow. For ten days the arm was kept in an internal right-angled splint; then a plaster-of-Paris splint was substituted, which extended from the wrist to the axilla. This was worn for six weeks. On September 22, two months after the injury, she consulted Dr. Fisk. She was suffering then with a severe ulnar neuritis of the little finger and the inner side of the ring-finger; the forearm was powerless and useless, and at the elbow there was a marked deformity. Examination disclosed a complete dislocation of both the radius and ulna outward and backward, which was confirmed by the fluoroscope. Two days later, after long and very forcible manipulations, under ether, he succeeded in reducing the dislocation, and in securing both complete extension and flexion, and also supination and pronation. The elbow was then brought to a right angle, and a plaster-of-Paris splint put on extending from the knuckles to the axilla, which was removed at the end of five days, when the elbow was bent to an acute angle and held by another plaster splint. This was taken off at the end of ten days, the elbow was then given massage

daily, and the woman permitted to use the arm moderately. The contour of the elbow is excellent; she has almost complete flexion, extension to more than a right angle, and perfect rotation. The outcome is excellent for a dislocation of two months. The degree of both extension and flexion will improve with time.

PROSTATECTOMY.

DR. PARKER SYMS read a paper with the above title, for which see page 313.

DR. BRIDDON said that personally he objected to any radical operation on the prostate until the gravity of the case demanded it. These patients can usually be carried along for many years with comparative comfort to themselves: it is only when the bladder becomes infected by the introduction of dirty instruments or otherwise that their real troubles begin. The suggestion made by Dr. Syms—*i.e.*, that in doing a perineal prostatectomy the prostate might be pushed downward through an opening made in the peritoneal cavity—was very ingenious: his own impression, however, gained from a rather limited experience with the perineal operation, was that by making a free dissection of the perineum, consisting of a median supplemented by a cross-section (slightly modifying the Zuckerkandl method), the prostate could be brought down by traction without any aid from above, and without opening the peritoneal cavity. The selection of any operative procedure would be decided by the direction of the growth, if it should be upward into the bladder, the suprapubic, if downward towards the rectum, the perineal section.

In conclusion, Dr. Briddon expressed the opinion that prostatectomy was an operation which would be resorted to less frequently in the future than in the past. If we get these patients before infection of the bladder has occurred, they can often be made comfortable for life. Even in advanced cases, occasionally, the distortion of the urethra becomes so modified as to render urination less frequent and difficult. The fact should not be lost sight of that usually these patients are advanced in years and broken down in health, with an infected bladder and a complicating pyelonephritis, and in no condition to bear a severe operation.

DR. DAWBARN said he wished to enter a gentle protest

against the objection made by Dr. Syms to suprapubic cystotomy as a means of draining the bladder, claiming that because by this method the drainage is uphill, it is less effective than drainage through the perineum. The speaker said that about two years ago he had demonstrated before the Surgical Society and also the Genito-Urinary Section of the Academy a method of suprapubic drainage, to which Dr. Syms's objection did not apply: the method consists practically of intermittent siphonage by means of a large fountain syringe and a trap made by a knot in its outlet-tube, which device can be so regulated that the bladder will be kept empty without wetting the bed. It has been described in the *ANNALS OF SURGERY*, and more fully and later in the *Medical Record*. Dr. Dawbarn said that he would guarantee to keep the patient's bed dry by his method, and with extremely little attention needed.

DR. HOTCHKISS said that, although his experience with the radical operation for enlarged prostate was limited, he had become convinced that the same method was not equally applicable to all cases. In some cases it is extremely easy to enucleate the gland through a suprapubic opening, while in others the perineal operation is easier. In one case, coming under the speaker's observation, he found it impossible to do a suprapubic prostatectomy on account of the contracted condition of the bladder; but found no difficulty in entirely enucleating the enlarged gland through the perineum. The patient left the hospital in three weeks, and regained complete control of the bladder, the capacity of which had rapidly increased. In another case, where he had attempted the same procedure, he found it impossible to reach the gland properly through the anterior perineal incision.

In reply to a question, Dr. Hotchkiss said that he had done a submucous enucleation, thus leaving the urethra in good shape.

DR. F. TILDEN BROWN inquired whether the use of a padded retractor inserted into the rectum would be of any service for the purpose of drawing down the prostate? The speaker thought it possible that such a procedure might obviate the necessity of making a suprapubic opening for the purpose of forcing down the prostate.

DR. MCCOSH said he agreed with Dr. Syms, that suprapubic drainage was often unsatisfactory. Some bladders would not drain properly through a suprapubic opening, no matter which

method of drainage was employed, whether it be that of Dawbarn or Keen, both of which he had used. It was often impossible to tell beforehand whether the bladder would drain well or not. Some bladders will drain more perfectly through a perineal incision; others through a suprapubic opening. If the cases could be constantly watched by a skilled attendant, night and day, this uncertainty of drainage might perhaps be obviated; but in ordinary hospital practice this is often not feasible, and consequently the drainage is often unsatisfactory, no matter whether the opening be made above the pubes or in the perineum. It seemed to him that, especially in old men, perineal drainage was more often satisfactory than was suprapubic.

The main objection, as it seemed to him, to Dr. Syms's idea of doing a laparotomy to assist the surgeon in forcing down the prostate through a perineal opening was the danger of infecting the peritoneal cavity. With extreme care and the use of gloves it could, however, be done with comparative safety.

DR. B. F. CURTIS said that one objection to Dr. Dawbarn's method of siphonage draining was the pain which it occasionally gave rise to. In a number of cases, where the speaker had tried it, it had to be interrupted on that account. The pain is due to the fact that the suction draws the mucous membrane into the eye of the catheter.

DR. DAWBARN said that if his method of siphoning the bladder through a suprapubic opening is properly done, it will cause the patient no discomfort whatever. The end of the catheter should be cut off, thus giving it two openings. There is no difficulty in regulating the intervals in this method of intermittent siphonage, as the suction can be repeated as often as we see fit, —say once every minute or two minutes.

In reply to the statements made by Dr. McCosh, Dr. Dawbarn said that this method could not fail to produce satisfactory drainage of the bladder in *any* case.

DR. WALKER said he had had some experience with Dr. Dawbarn's method of siphonage draining, and he agreed with him that when it was properly arranged the mucous membrane of the bladder was not drawn into the eye of the catheter.

DR. GALLAUDET said he wished to say a word in favor of plain gauze packing as an effective and satisfactory method of draining the bladder. Personally, he always resorts to that

method, and has never used tubes for that purpose. This packing can readily be removed and replaced, if necessary.

DR. SYMS, in closing, said he desired to emphasize the statement made in his paper that a suprapubic opening in the bladder was not a good one for drainage; furthermore, the danger of setting up infection in the loose tissue of the prevesical space is very great.

The speaker said that the necessity of a suprapubic opening was the only objection he had to urge against Alexander's operation, which was otherwise a very excellent one.

Stated Meeting, November 23, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

FRACTURE OF THE VERTEX AND BASE OF SKULL.

DR. WILLY MEYER presented a boy, six years old, who on the 11th of June last was brought to hospital two hours after he had fallen from a fire-escape outside the second-story window of a flat-house. He was somewhat shocked, but had not been unconscious. On the operating table it was found that he had two small lacerated wounds over the right frontal bone; both were covered with blood-clots and from one a small quantity of brain-tissue had oozed. There was also bleeding from the nose, and a good deal of subconjunctival hæmorrhage, and it was said that he had vomited blood shortly after his fall.

Upon enlarging the two external wounds, a fracture of the frontal bone was made out, with multiple fissures extending in all directions through the parietal bone, posteriorly towards the mastoid, and one towards the supraorbital border; on tracing up the latter it was found that it extended through the roof of the orbit. Some of the fissures extended back for such a distance that it was impossible to follow them to their termination. At the point of fracture there were a number of loose fragments of bone, which were removed. The dura was also lacerated. After proper enlargement of the dural rent it was seen that the brain-substance had been severely injured at that point and was

covered by a blood-clot. This was removed, an iodoform gauze drain inserted through the dura mater, and the wound partially closed. The body made an uneventful recovery and has had no trouble since his discharge from the hospital, the latter part of July.

Dr. Meyer said he attributed the good result in this case to the fact that the patient was operated on early and that drainage was employed. The speaker suggested that it would, perhaps, not be a bad plan, especially in all cases of fracture of the middle fossa of the skull, with bleeding from the mouth, nose, or ear, to trephine the skull and drain the epidural space; perhaps, in this way, the occurrence of a meningitis could be easier averted.

A considerable portion of the frontal bone at the seat of the injury was missing in the case shown by Dr. Meyer, and in order to fill this gap he thought that a second operation would be advisable as a precautionary measure. In such young subjects, the bones of the skull are thin, the insertion of an artificial plate of celluloid or other foreign material would not be apt to prove satisfactory. It probably would become loose in course of time due to the growth of the skull. The speaker said he would be inclined to try the method followed by Barth, of Marburg, lately again recommended by Grekoff, of St. Petersburg,—namely, to fill the gap with calcined (not decalcified) bone, preferably portions of the scapula of a young calf.

DR. F. W. MURRAY asked for information as to the action of calcined bone when employed to close the defects. As regards the transplantation of fragments of bone, it was a question whether absorption of the fragment would not take place after a time, even if the fragment became firmly attached in the beginning.

DR. L. A. STIMSON said the principle underlying the introduction of calcined bone, in a case like the one shown by Dr. Meyer, was quite different from that involved in the use of an artificial plate; the bone is employed not merely to fill the gap, but also to supply lime-salts, which can be utilized by the system in the formation of new bone. The same idea has been advocated in the treatment of fracture of a long bone, where union has been long delayed: it has been alleged that in such cases the presence of calcined bone amid the granulations about the fractured ends will hasten union.

Apropos of this subject, Dr. Stimson reported the case of a young man who, about twenty years ago, while taking part in some athletic games, was struck on the forehead by a heavy hammer, producing a fracture of the frontal bone. After removing the fragments of bone a gap was left fully two inches in diameter. Dr. Stimson said he had recently seen this man again, and an examination showed that the gap in the skull had remained practically unchanged. The patient had enjoyed good health since the accident, with the exception of a number of attacks of *petit mal* about seven years ago.

Dr. Stimson said that the usual cause of death in cases of fracture at the base was not meningitis. Each year he saw from forty to fifty of these cases, only a small proportion of which showed any traces of meningitis. The fatal issue is usually due to the general contusion of the brain, and this condition could hardly be benefited by trephining the skull, nor would draining the epidural space, with the view of lessening the danger of a subsequent meningitis, do much good. The fracture of the base is a mere incident in these cases, the fatal injury lying beyond that, within the cranium.

DR. F. H. MARKOE said the use of calcined bone had been recommended as a means of supplying the necessary bone-salts and also to act as a temporary support to the blood-vessels which are forming. The speaker said that, so far as he knew, the claim had never been made that a piece of bone, thus inserted, became vitalized and remained as a permanent thing.

Dr. Markoe said he agreed with Dr. Stimson that in the majority of these cases, where death occurs, the fatal issue is due to the injury of the cerebrum, meningitis being very rare. In cases where there has been severe cerebral concussion and probably a good deal of serous effusion, drainage of the epidural space might to some extent relieve the pressure.

DR. B. FARQUHAR CURTIS said that in a youthful patient, like the one shown by Dr. Meyer, one might expect that such a gap in the skull would become at least partially closed by the formation of new bone. The speaker said he had recently seen such a case reported, where the growth of bone was readily demonstrated. This, of course, would not be likely to occur in adults. In the case shown by Dr. Meyer the gap in the skull was so situated that it was not very liable to injury.

DR. F. W. GWYER said that in some of these cases the contained blood and clots gave rise to serious symptoms, aside from those caused by actual laceration or contusion of the brain-substance; and in such instances the suggestion made by Dr. Meyer—namely, to trephine the skull—would no doubt prove of great service as a means of relieving pressure. The speaker said he had resorted to this measure in several cases of pure fracture of the base of the skull accompanied by pressure symptoms, and removed the blood-clots: in some cases the clot was found outside the dura, and in others within the dura; after its removal the symptoms cleared up very much indeed. In the successful cases, of which there were two or three, the patients soon became conscious and made a good and quick recovery. One precaution to bear in mind in resorting to this step is, not to open the skull too soon, lest the hæmorrhage is still going on, and being beyond control except by packing, the packing would give equal symptoms to the clot, and nothing would have been gained. It would be better to wait two or three days, until the hæmorrhage had been checked by the formation of a clot, which could then be removed with very slight danger; the introduction of a small amount of drainage material would then be sufficient.

DR. ARTHUR L. FISK thought that by trephining in these cases, as suggested by Dr. Meyer, the pressure symptoms, which might be due to either hæmorrhage or serous effusion, similar to that occurring in the joints from trauma, could be relieved in all probability. Warren has reported a case of fracture of the base, which he trephined and drained, and the patient made a good recovery. Another case operated upon by Dr. Dunham at Bellevue on opening the dura a quantity of serous fluid escaped, the symptoms were relieved and the case recovered.

DR. MCCOSH, in confirmation of the statement made by Dr. Gwyer, said that even twelve hours after the receipt of the injury in these cases he had found the hæmorrhage excessive and sometimes uncontrollable, except by jamming in a large amount of packing. In several such cases he was unable to locate the source of the hæmorrhage, and in one instance the patient practically bled to death.

DR. MCCOSH said he had resorted to trephining in some half a dozen cases of fracture at the base, and in every instance,

if his memory was correct, the patient had died. With a single exception, the fatal issue was due to contusion and laceration of the brain-substance, with more or less intracranial hæmorrhage. The cases had all been desperate, and probably in none was the fatal result hastened by the operation. He believed that in certain cases of fracture of the base operative interference was indicated.

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TUBERCULAR LYMPHOMATA OF THE NECK.

DR. A. B. JOHNSON presented a young man who had recently been operated on for tubercular lymphomata of the neck. He was shown in order to illustrate the method usually followed at Roosevelt Hospital for the removal of extensive tubercular glands in this region. A wide S-shaped incision is made, with the ends of the S turned either way, according to the situation of the lymphomata, and the sterno-cleido-mastoid muscle is divided and turned out of the way. This dissection, while extensive, is harmless, and gives free access to all the triangles of the neck, enabling one to remove all the tubercular glands lying along the course of the vessels, without wounding the latter. The functional result of this method is also remarkably good. The incision was first used by Dr. Frank Hartley.

DR. GEORGE WOOLSEY said he had found the S-shaped incision advantageous in cases of very extensive lymphomata of the neck. The objections to it are the unsightliness of the scar it leaves, and its proneness to develop false keloids. Dr. Woolsey said that an obliquely horizontal incision, parallel with the cleavage-lines and creases of the skin, gives very free access to the contents of the neck and leaves a beautiful cicatrix. In very extensive cases, however, the access it gives is not sufficient.

DR. WILLY MEYER said that in cases of extensive glandular enlargement in the neck, with a good deal of contracted, sclerosed tissue around the glands, he had found that transverse division of the sterno-mastoid muscle was a great help, allowing him to gain freer access to the parts and obviating the danger of wounding the deep jugular vein. By stitching the tissues layer by layer, the resulting scar is not very unsightly. In females, to avoid scarring as much as possible, he tried to get along without dividing the muscle.

DR. HOWARD LILIENTHAL said he did not consider it a good principle to make two incisions where one would answer. The speaker said he had usually been able to reach all the affected glands by making an incision from a point just behind the mastoid process, extending forward to the anterior border of the sterno-mastoid, then down along the border of that muscle, and curving slightly backward to a point above the outer third of the clavicle. Such an incision gives access to both the anterior and posterior glands by raising the flap included in the incision.

The speaker said he had never found it necessary to cut the sterno-mastoid, nor did he think such a step was necessary in the large majority of these cases. The muscle can be relaxed by holding the patient's head in the proper position. Division of the muscle sometimes results in a certain amount of paralysis, and the scar it leaves is not a pleasing one.

DR. C. K. BRIDDON said that in these cases the surgeon must modify his incision according to the size and position of the glands which he intends to remove. He was inclined to the view that the Y-shaped incision of Kocher was the most useful, as it gives ready access to the glands which are usually involved and most difficult to enucleate,—namely, those about the styloid process. The speaker said he was opposed to division of the sternocleido-mastoid; he regarded this as an unnecessary procedure, because with good assistants and retractors the muscle can be readily drawn out of the way.

CARCINOMA OF THE RECTUM.

DR. F. W. MURRAY presented a man, forty-three years old, who was admitted to St. Luke's Hospital in February, 1897. The patient stated that for several months previous to that date he had passed a good deal of blood with each movement of the bowel, and had suffered much pain in the rectum. He was anæmic, had lost considerable weight, and his general condition was poor. An examination of the rectum revealed a mass, starting about one and a half inches above the sphincter, and encircling the lumen of the gut in a spiral shape for a distance of one to two inches. The tumor appeared to be made up of papillary growths which bled freely on manipulation. A section of the growth was removed for microscopic examination, and the pathologist pronounced it a malignant adenoma.

In order to remove the growth, about two and one-half inches of the rectum was resected through the Kraske incision, the coccyx alone being removed. The ends of the divided gut were united with two rows of interrupted silk sutures, and the external wound closed. The wound healed by first intention, and the man had practically recovered from the operation in ten days. He improved rapidly in weight and strength and soon resumed his work. In November, 1897, the patient was examined and found to be free from recurrence; in May, 1898, he was still free from recurrence.

He remained well until July, 1898, when he again began to pass blood by the rectum, and an examination showed a mass, about the size of a silver dollar, on the posterior wall of the rectum, and involving the sphincter. A second operation was performed in August, this time about four or five inches of the rectum, together with the sphincter, being removed. The gut was pulled down and Gersuny's method of torsion was employed to obtain sphincter action. The wound healed kindly and the man left the hospital in five weeks in very fair health, and is now able to work as usual. He has two passages a day, one before and one after breakfast. There is a slight prolapse of the mucous membrane of the rectum, but there is no incontinence of fæces, and no odor.

On introducing the finger in the rectum a fair amount of resistance is felt. The case has been presented as a successful result by the ingenious method devised by Gersuny to prevent incontinence in this class of cases.

ANEURISM OF THE FEMORAL ARTERY.

DR. L. A. STIMSON presented a man, aged about forty-five years, who was admitted to the New York Hospital the latter part of August, 1898, for the relief of a tumor on the inner side of the right thigh, which had appeared about a year before as a small lump and had slowly increased in size until very recently, when the increase was quite rapid. The original tumor was attributed to a blow.

A few days after the man's admission to the hospital, when Dr. Stimson first saw him, the tumor was about the size of two fists. Distinct pulsation could be recognized, and at the upper end of the tumor a strong, harsh murmur could be heard. The

diagnosis made was ruptured aneurism of the femoral artery. It was operated on by opening and dissecting out the sac, turning out the clot, and ligating the artery above and below. The incision made extended from just above the condyle to the upper third of the thigh. The cavity contained a large blood-clot and the remains of the sac. The patient made an uneventful recovery.

Dr. Stimson said that this method of treating an aneurism—*i.e.*, by dissecting out the sac—has recently met with considerable favor. The speaker said he hardly thought it should be resorted to in every instance, as it is unnecessarily severe where a simple ligation would answer. It should be the operation of choice, however, in any case where there is danger of serious interference with the return circulation by the pressure of the tumor.

Dr. CURTIS said he had occasion, last summer, to extirpate an aneurism of the common femoral. The patient was a syphilitic, who the year previous had had an aneurism of the popliteal artery in the right leg, which had been successfully treated with potassium iodide and rest in bed. The aneurism of the left common femoral made its appearance last January, and when Dr. Curtis first saw the patient it had attained the size of a small hen's egg, and was situated just below Poupart's ligament.

In order to cure the aneurism the external iliac was ligated, but after closing the wound it was observed that pulsation had returned in the tumor. As the patient was very anxious to be cured, an attempt was thereupon made to dissect out the sac far enough to tie off the principal communicating branches; in attempting this, the sac was ruptured, producing a rather profuse hæmorrhage from the lower end of the sac, where the profunda entered. There was another large bleeding artery at the upper end of the sac. After securing these arteries, the remnants of the sac were dissected out and the wound closed. The circulation in the foot was completely restored within forty-eight hours, and no gangrene occurred, probably because all the muscular branches of the limb upon which the collateral circulation depended were widely dilated. The wound healed by first intention.

Dr. MURRAY, who had had an opportunity to examine the patient shown by Dr. Stimson when the man was first admitted

to the hospital, said the tumor was considerably larger than two fists. From the clinical history of the case and as no pulsation or murmur could be at first made out, the growth was regarded as a sarcoma. Upon introducing a needle, however, only blood was withdrawn. Two days later slight pulsation was noted, and a murmur could be heard directly over the spot where the needle had been inserted. It was possible, the speaker said, that the needle had broken up the clots.

CARCINOMA OF TONGUE; NO RECURRENCE THREE YEARS AFTER EXCISION.

DR. ARTHUR L. FISK presented a woman, aged fifty-three years, upon whom three years previously he had operated for carcinoma of the tongue. Her history was as follows:

A. S., a spinster of fifty years of age, consulted him on August 15, 1895, because three weeks before she had experienced some difficulty in swallowing, and upon running her finger into the back of her mouth, she had discovered a small tumor at the back part of the tongue. The growth of this had been quite rapid during the preceding week. Upon examination he found at the base of the tongue, on the left side, a small pedunculated tumor about the size of a Concord grape, which was without any attachments to the surrounding structures. The operation was on August 26, 1895, at the Cancer Hospital. Ether was the anæsthetic used. He did a tracheotomy first, then packed the pharynx, and excised the left half of the tongue by Kocher's method. The tracheotomy-tube was removed at the end of twenty-four hours and not replaced, as was also the packing in the pharynx. The mouth was cleansed hourly, except when the patient was sleeping, with a saturated solution of boric acid alternating with a weak solution of hydrogen dioxide. During the first four days she was fed through a stomach-tube; after that fluids were given by mouth. The convalescence was uneventful, and on September 20 she left the hospital with the wounds entirely healed. She had reported to him regularly since then, and there has never been any sign of recurrence.

Dr. Buxton's—the pathologist to the hospital—report is:

The tumor, lying on the left upper surface of the tongue, two inches back from the tip, shows a round, white nodule, about five-eighths of an inch in diameter; the base where it springs

from the surface of the tongue, measuring about three-eighths of an inch in diameter. The tumor is of rather soft consistence; there is no ulceration of the surface, nor does there appear to be infiltration of the underlying tissue. The mucous membrane covering the tumor is continuous with that of the tongue. Microscopic report, September 2: Epithelioma: neither the sub-maxillary gland nor an enlarged lymphatic show involvement. Sections taken from the base of the tumor show slight infiltration of the muscular tissue of the tongue. A small buccal gland shows no involvement. Dr. E. K. Dunham also examined the specimens, and the report agreed with the foregoing,—“a rapidly growing epithelioma.”

DR. WILLY MEYER said that, on the 7th of January, 1897, —now almost two years ago,—he had operated on a man, fifty-six years old, by the Kocher method, removing almost the entire tongue. The patient had had leucoplacia for many years, which had developed rather rapidly into epithelioma at the base of the tongue. Quite a number of glands were involved. A thin strip of the right side of the tongue was left, and in order to render this more serviceable it was turned back on itself and stitched in that position.

Dr. Meyer said he regarded Kocher's method as the ideal operation in these cases, as it gives the surgeon an excellent opportunity to remove all the glands. It is well known that a recurrence is more apt to occur in the glands of the neck than in the stump of the tongue. Another advantage of this operation is that the bone is not divided, which is often a source of great comfort to the patient. In all cases where the growth is not adherent to the jaw, the speaker said, he would prefer the Kocher method of operating.

DR. WILLIAM B. COLEY said that, inasmuch as the disease rarely attacked the posterior third of the tongue, and inasmuch as the anterior portion can be thoroughly removed by the Whitehead operation, he thought that the more formidable Kocher method should be reserved for those cases where the disease originates far back. Recurrence is more apt to occur in the glands than in the stump, in the proportion of three to one. The Whitehead operation, with the preliminary tying of the lingual arteries, he believed the best method in the majority of cases. By enlarging the incision for ligature of the lingual ar-

teries the sublingual and submaxillary glands could be easily removed.

Dr. Coley said that the three-year limit, which will probably have to be modified in regard to the permanent cure of carcinoma in general, was decidedly defective in regard to carcinoma of the tongue. Cases have been reported where a recurrence took place after five years, and in one instance after nine years.

DR. BRIDDON said that the Whitehead method of excising the tongue, preceded by ligation of the lingual artery, had been his ideal operation until very recently. He had last performed the operation about five weeks ago, first tying the lingual on both sides, on one side within the triangle, on the other outside, and then proceeding to remove the tongue. The first incision produced the most profuse hæmorrhage he had ever seen in an operation on the tongue, and it was arrested with great difficulty. The man died about fifteen minutes after the completion of the operation from shock and anæmia.

Dr. Briddon said he had tied the lingual arteries in quite a number of cases; in some of them the subsequent removal of the tongue was bloodless, while in others there was considerable hæmorrhage. In the latter cases there was probably some anomalous distribution of the arteries. After his recent experience the speaker said he did not feel inclined to again rely upon ligation of the linguals as an efficient means of controlling the bleeding in these cases, or, if he did so, to make the excision of the tongue very carefully.

DR. CURTIS said he thought it exceedingly important in these cases to remove all the diseased lymphatics and the tongue well back to the hyoid bone. In order to avoid the necessity of forcing the tongue through the wound, the speaker said he had of late employed a combination of the Kocher and Whitehead method. Through a Kocher incision he dissects out thoroughly the glands on the affected side; a clamp is then left on the stump of the mass cut away, so that lower attachments of the muscles coming from the base of the tongue and the lymphatics in the connective tissue between them are completely divided. Then the tongue is drawn forward and removed through the mouth, as in the Whitehead operation, but bringing with it the sublin-

gual tissues in the pedicle of the mass previously extirpated from below.

Dr. Curtis said he had seen the Whitehead operation, after ligation of the linguals, in the ordinary situation followed by severe bleeding, which he thought came from the posterior branch. With the Kocher method of dissection the vessels are tied so far back that the hæmorrhage is usually insignificant.

PSEUDARTHROSIS IN A PATELLA.

DR. CURTIS showed an X-ray picture of a fractured patella with pseudarthrosis, which he had treated by wiring. The patient was a fireman, fifty-five years old, who last April sustained what was supposed to be a sprain of the knee while sliding down the brass pole in the engine-house. He apparently recovered from this injury, and during the following September he fell off a box and sustained an injury of the same knee with all the usual signs of a simple fracture of the patella. On exposing the bone by incision, however, evidences of an old fracture through the patella were discovered. The bone had probably been broken by the injury the previous April, and had gone unrecognized. The fissure ran transversely at the junction of the upper one-third and lower two-thirds of the bone directly to the joint. The adjacent surfaces of the bone were smooth, covered with a thin layer of fibrin, and showed evidences of having been polished against each other by friction, so that there was probably no separation by the first injury,—merely a fissure. The second injury had separated the two parts of the bone and lacerated the expansion of the extensor tendons on each side. There was considerable blood in the joint. Dr. Curtis said he wired the patella without passing the wires through the upper fragment, simply passing them through the ligament above the edge of the bone. An excellent functional result and close apposition were obtained.

VICIOUS UNION AFTER FRACTURE OF FOREARM.

DR. CURTIS exhibited an X-ray photograph showing cross-union of the radius and ulna. The patient was a soldier who, while on his way to Porto Rico on a transport, fell and sustained a compound fracture of both bones of the right forearm just below the middle. On his return to this city, five weeks after the

accident, it was found that the lower fragment of the radius had united to the upper fragment of the ulna, resulting in an entire loss of rotation of the hand and forearm.

The ends of the bones were exposed, slightly shortened, and then wired. The ends of the wires were brought out of the wound and dressing, carried through the plaster-of-Paris splint, and secured on the outside. Shortly after the operation the patient developed typhoid fever. From the third week after the operation on, tension was kept up on the ends of the wires so as to increase the interosseous interval. When the splint was removed, six weeks after the operation, there was union of the bones, and at the present time there is more than half the normal amount of rotation.

A MISLEADING SKIAGRAPH.

DR. CURTIS showed an X-ray picture which revealed, apparently, a pin in the œsophagus. The patient was a child who had swallowed a hat-pin, about two inches long, with a glass head. An unsuccessful attempt was made to locate the pin by the aid of the fluoroscope. An X-ray picture was then taken which apparently revealed a thin, dark body, like the shaft of the pin, in the œsophagus. The picture proved to be deceptive, however, as the pin was recovered shortly afterwards in the stools, and the supposed pin was a defect in the gelatin of the plate,—but not a mere scratch on the surface which could easily have been recognized. The case illustrates the necessity for care in the interpretation of the X-ray negatives.

SARCOMA OF THE ABDOMINAL WALL.

DR. ALEXANDER B. JOHNSON showed a specimen of a spindle-celled sarcoma, which he had removed from the abdominal wall of a woman four days previously. The growth began subcutaneously as a minute nodule about two years ago, gradually increasing in size, in spite of internal treatment and external applications. About two months ago it had begun to ulcerate on the surface. At the time of operation it measured about 8 x 6 x 6 inches, and was situated in the lower part of the abdominal wall upon the right side.

The speaker said that in a similar case which he saw at Bellevue Hospital, some years ago, in an elderly woman, the

peritoneum was involved, and it was necessary to remove the entire thickness of the abdominal wall: that patient died of shock. In the present case he was able to leave the innermost layer of muscles and the peritoneum, excepting at one small point, where the muscular and fascial layers were entirely removed. The wound was partly closed by suturing, leaving a gap about two and one-half inches wide, which will be covered with skin-grafts.

ELBOW-JOINT ANKYLOSIS.

DR. BRIDGON presented a fresh specimen representing the bones entering into the composition of the elbow-joint, the parts were fused together into one mass, and it was difficult to determine whether the relation of the parts had been disturbed in the original accident; that, however, could be made out by the contemplated section of the specimen. The ankylosis was at such an angle as to render the arm practically useless. The specimen was removed from a girl seventeen years old, who, four years before, had fallen from her bicycle, striking her right arm; the elbow-joint became gradually painful and stiff, the latter condition increasing until it resulted in bony union. There was no tubercular or other dyscrasia to account for the condition.

RESECTION OF THE LIVER.

DR. WILLY MEYER reported the case of a woman who had a movable tumor, hard and irregular in outline, situated within the abdominal cavity, a little to the right of the median line, about the location where we often find pyloric cancer. As the tumor had recently grown comparatively rapidly, an exploratory incision was made; this disclosed a lobulated liver, with one of the lobules primarily affected by a new growth. Resection of the liver at its base was thereupon performed. After passing a long needle through the organ, armed with a double catgut thread, its affected portion was temporarily ligated and then removed with the cautery. The resulting hæmorrhage was comparatively slight. When almost through with removal of the tumor, the speaker was annoyingly surprised by finding that in the centre of the lobe a string of malignantly affected tissue entered the parenchyma of the liver above the line of division. The patient made a good recovery from the operation, but a recurrence of the disease, rather continual growth, rapidly took place.

In another case of this character, Dr. Meyer said, he would resort to a V-shaped incision with the knife, stitching the liver afterwards. Such a procedure was impossible in this case on account of the broad base of the lobe.

DR. LILIENTHAL said he had recently shown a specimen of a case of resection of the liver for supposed malignant disease. There were no secondary nodules, simply this single node, about the size of an English walnut. Two transfixion sutures of thick catgut were passed through the liver well behind the nodule and loosely tied, so as not to cut through the peritoneal coating of the liver; an incision was then made outside the sutures, and this portion of the liver removed. The cutting was done very carefully, a little at a time, and as the blood-vessels appeared in view, like white glistening cords, they were caught and tied before they were divided. There was absolutely no hæmorrhage, excepting that coming from the distal portion of the liver. The transfixion sutures were not disturbed, a piece of gauze was placed over the liver surface and a large piece of rubber tissue next to the intestines. The patient made a prompt recovery, and was discharged with the diagnosis still in doubt. He had since been lost sight of. The pathologist, who examined the specimen, expressed the opinion that it was a perithelioma, and that it probably had its origin in a tumor in one of the suprarenal bodies.

EDITORIAL ARTICLE.

DISCUSSION ON NEPHROTOMY AT THE FRENCH SURGICAL CONGRESS OF 1898.

MM. GUYON and J. ALBARRAN introduced the subject by a paper, an abstract of which is as follows:¹

Only since 1870 has nephrotomy been practised. In their report the authors neglect the details of operative technique, since these are well established and known. It is rational to reserve the term nephrotomy to the simple incision of the kidney, and give the name nephrostomy to those operations in which the pelvis is opened through the renal tissue, the kidney-wound being kept patent, and a surgical fistula created.

I. *Nephrotomy*,—i.e., temporary opening of the kidney.

(A) *Exploratory Nephrotomy*.—This is the best method of exploring the kidney. Acupuncture is inefficient, and radiography has not yet given satisfactory results. The operation consists in exposing the kidney through a recto-curvilinear or oblique lumbar incision, in stripping it of its fatty envelope, and pulling the organ outward, so that its pedicle may be compressed by the fingers of an assistant. Through a long incision on the convex border the pelvis is reached. This incision fulfils the following conditions:

- (1) It destroys the minimum of renal tissue.
 - (2) There is little bleeding.
 - (3) It gives the best possible access to the calyces and pelvis.
 - (4) It exposes to view the maximum of renal tissue.
- (B) *Nephrolithotomy* is nephrotomy plus extraction of a cal-

¹ Revue de Chirurgie, November, 1898, Supplement,

culus through the renal wound. The only question to discuss in this connection is whether it is better to extract the stone through a nephrotomy wound or through a cut in the walls of the pelvis (pyelotomy). The latter method has the advantage of sparing secretory parenchyma, but through such a wound exploration is less perfect, the removal of certain calculi more difficult, and fistula are very much more frequent results.

(C) It is only necessary to mention those nephrotomies which aim at assisting more complicated operations on the pelvis, or on the upper end of the ureter, to re-establish the urinary passage.

II. *Nephrostomy*.—Establishment of a renal fistula.

This operation may be done by the transperitoneal or by the lumbar routes. The authors prefer the lumbar. The conditions which a good nephrostomy ought to fill are the following:

(1) To expose the kidney easily. The recto-curvilinear incision (Guyot) or the oblique incision downward and outward are the best.

(2) To give free communication between the renal pelvis and the numerous pouches which exist in distended kidneys.

(3) To open peripheral purulent foci and to facilitate later operations. The best means of doing this is to sew the two halves of the renal tissue to anterior and posterior lips of the parietal wound, as near the skin as possible (Guyot).

If a kidney has been nephrostomized before there has been any retention of urine in it, the urine is secreted in abundance and is analogous to normal urine; the injury to the parenchyma is unimportant, and the renal tissue, in spite of its free communication with the exterior, offers remarkable resistance to infection. When a kidney has been opened after retention has taken place, the same resisting power is observed; the renal function is re-established in a more or less perfect manner, as soon as the obstruction of the flow of urine is surmounted. Alterations in the parenchyma are naturally more marked in cases of septic

retention than in those of uronephrosis, in complete retention than in partial, and more persistent in cases of retention of long duration.

General Indications for Nephrostomy.—The aim of nephrostomy is to evacuate renal retention, whether septic or aseptic, or in cases of anuria to re-establish the renal function.

(1) *Nephrostomy in Anuria.*—In the anuria of calculus the operation must be of short duration, because account must be taken of the grave general condition of such patients, and it must not be forgotten that in almost every such case both kidneys are in an advanced stage of disease. Nephrostomy seems to be the operation of choice and much superior to ureterotomy (a long and delicate operation), to pyelotomy, which gives less assurance of success in re-establishment of function, and to nephrotomy, because when sewn up a kidney secretes less than when left open.

(2) *Nephrostomy in Uronephrosis.*—The authors admit the propriety of nephrectomy, if it is impossible to establish the normal course of the urine (through the ureters, etc.), only, however, if the remaining kidney is normal. Nephrostomy, on the contrary, is a conservative operation, but in this case is not the essential part of the operation, since it is to the removal of the cause of the renal retention that the principal attention ought to be given.

(3) *Nephrostomy in Pyonephrosis.*—(a) *Pyonephrosis Simplex.*—Here the advantages of nephrostomy are evident. The objection always raised against the operation is the frequency of post-operative fistula, but in a certain number of cases one can avoid this accident or cure it if it does occur. There are scarcely any indications which might call for nephrectomy, since it is so much graver, and since lesions are frequently present in the remaining kidney, while the organ removed is often quite capable of useful action. Nephrostomy is also almost always preferable to interventions which aim at re-establishing at once the normal uri-

nary passages. It is much better to practise these plastic operations secondarily.

(b) *Tuberculous Pyonephrosis*.—The nephrostomy is indicated only when the condition of the other kidney is unknown or when the local conditions would make nephrectomy too dangerous. Some writers advocate a primary nephrostomy and secondary nephrectomy some weeks later. Statistics, however, show that secondary nephrectomy is as grave as primary, so that it is better to do the nephrectomy at once. When adhesions between the kidney and the large abdominal vessels are so intimate and extensive that the operation would necessarily be a prolonged one, then nephrostomy is preferable to nephrectomy.

In conclusion the authors consider that among the therapeutic triumphs of renal surgery there are none more important than those which have followed the operation of nephrostomy.

M. LE DENTU (Paris), in discussion, called attention to cases of nephritis simulating calculous disease. Attacks of nephritic colic and passage of fine sand are common. Medicinal treatment fails. On exploration no calculus is found. Yet following multiple punctures of the parenchyma and nephrotomy recovery ensues. He considers that exploration should be resorted to when medicinal treatment has failed and when the symptoms recur for several years; that it is legitimate to operate even after a duration of the disease for only some months.

M. TÉDENAT (Montpellier) has not been troubled by persistent fistula after nephrotomies. Diagnosis of calculous disease is made by the antecedent lithiasis, by the spontaneous pains, especially by the acute pain provoked by a pressure or sudden contusion of the kidney. Hæmorrhage increased or provoked by exercise is a sign of importance. Calculous disease may be simulated by various diseases,—*e.g.*, nephralgia, nephritis, small contracted kidney,—since they may all occasion pain and hæmorrhage. M. Tédénat makes the lumbar incision oblique and slightly curved.

M. LÉONTE (Bucharest) practises nephrectomy more frequently than nephrotomy. Out of twenty-seven cases recently operated upon, in twenty he did nephrectomy, in seven nephrotomy. In two of these cases the nephrotomy was exploratory, in five therapeutic. Before nephrectomy Léonte always incises the kidney to learn the extent of the disease.

Nephrotomy may be curative as in the following case: Persistent right renal hæmaturia, probably of calculous origin; nephrotomy. Uronephrosis: Ureter, explored by sound introduced through renal wound, found to be free. Calculus had been pushed into bladder, where it was afterwards found. In five cases he left the kidney open after nephrotomy (calculous pyonephrosis, 3; suppurative hydronephrosis, 1; simple hydronephrosis, 1). In all these cases the ureter was explored to see if obstruction was absolute, and as the renal parenchyma seemed capable of function he preferred nephrotomy. In such cases Léonte incises the convex border of the kidney and drains with iodoform gauze or a tube.

He considers nephrotomy as being essentially a palliative measure, since it can have no other result than providing a means of escape for septic products retained in the kidney. The indications for the operation are: Limited lesions; concomitant disease in the other kidney; obstruction of the ureter. All these indications refer to calculous and suppurative disease. If the other kidney is healthy, Léonte does not hesitate to give the preference to nephrectomy, which is a radical operation. He performed nephrectomy in twenty cases for the following diseases: Carcinoma, 2; calculous hydronephrosis, 2; pure or calculous pyonephrosis, 8; suppurative hydronephrosis, 1; pure hydronephrosis, 1; tuberculosis, 3; hydatid cyst, 1; gumma, 1; vaginal fistula, consecutive to hydronephrosis in pelvic ectopia, 1.

Three patients succumbed to advanced infection. All the rest recovered.

Léonte prefers the lumbar incision.

M. REYNIER (Paris) considers that, except in cases of calculous disease, nephrotomy has not come up to expectations. It almost always is followed by fistula. He prefers nephrectomy, which is as safe as nephrotomy, except when the opposite kidney is unhealthy. In twelve cases of nephrotomy he has had five deaths, and only one real cure.

M. BAZY (Paris), in operating, cuts from the costo-muscular angle to one or two finger-breadths above the highest point of the iliac crest. Fixation of the lips of the renal incision to the skin is useless or impossible. After nephrotomy he passes the ureteral sound or catheter, and leaves it *in situ* to prevent its closure by blood-clots. Certain pyonephroses are in part or entirely subcostal; this must be remembered lest some pouches remain unopened. Prognosis depends on many conditions, but especially on the state of the other kidney. This can hardly be appreciated by urinalysis. Catheterization of the ureter is useless and dangerous; methyl blue seems to be the best means of assuring oneself of its permeability.

Early nephrotomy in a truly conservative operation in suppurative disease,

Comparative study of urinary secretion in cases of hydro- and pyonephrosis due to obstruction, shows that the quantity of the urine excreted by the diseased organ may be, and often is, greater than that by the other; it may be double or treble.

The total quantity of urea is less, sometimes equal, sometimes greater; chlorides sometimes less and sometimes equal; uric acid less or equal; phosphoric acid, greater or less.

The remote results are generally good. In fifty cases of nephrotomy Bazy has had to repeat the operation twice, to do nephrectomy three times. Some patients have had fistula for months or years, and did not suffer inconvenience therefrom.

M. TUFFIER (Paris) has observed a very rare complication after a nephrotomy for the removal of a calculus,—viz., the hernia of myxoma of the kidney.

Multiple renal abscesses are a cause of failure in nephrotomy, owing to the fact that some lesions are overlooked.

Renal retentions and renal calculus give the principal indications for nephrotomy. Renal pains and hæmorrhages of undetermined origin may also justify the operation.

M. DOYEN (Paris) believes that, since physiology has shown that a very small portion of renal parenchyma suffices for function, nephrectomy will give place more and more to nephrotomy. With Bazy he considers retrograde catheterization of the ureters very dangerous, because of infection. In 1887 he proposed an easy method of discovering the state of the two kidneys. After having introduced a catheter into the bladder and having carefully washed out this cavity, he compresses the two ureters successively through the abdominal walls. Compression of the ureter corresponding to the diseased kidney gives cloudy urine, while compression on the other side gives clear urine.

M. J. ALBARRAN (Paris) divides fistulæ following nephrotomy into three classes,—viz., urinary, purulent, and uropurulent.

(A) Before a purely urinary fistula can arise it is necessary that the operation involve the pelvis or calyces, or that, owing to infection, these cavities have been opened secondarily. Fistula are rare after operations on non-distended kidneys, apart from tuberculous disease, even if pyelonephritis exists. When the original operation has been on a kidney in a state of retention then fistulæ commonly result. These fistulæ are not due to alterations in the kidney tissue, but to some obstruction to the flow through the ureter. Such obstruction may be due to stricture, acute curvature, or vicious insertion of the ureter into the pelvis. When the ureter is patent a fistula closes readily in spite of the usual lesions found in pyonephritis. Albarran has seen several fistulæ close after the ureter has been catheterized, the instrument being kept in place for some time.

It is classical to say that in urinary fistula with patent ureter the kidney should be vivified and sutured, but, in fact, if the

ureter is acting effectively as a drain, then the fistula will close of itself; if the ureter is not acting thus, suture of the kidney would lead to retention and danger.

In cases of post-operative urinary fistula, Albarran begins by determining the functional value of the kidney by means of cystoscopic catheterization of the ureters. If the urine from that kidney shows that the organ is worth preserving, he acts differently according as the ureter is or is not permeable to the sound. If the sound can be passed into the pelvis, he leaves it *in situ*, replacing it daily by a larger one until, if possible, No. 11 or 12 is reached. After the fistula has remained closed for fifteen days, the sound (which has been used for irrigation of the pelvis) is removed. At intervals examination is made to see if retention has been completely removed. If, in spite of closure of the fistula, there is still some retention, then either the ureter has failed to attain its normal calibre or there is vicious insertion of the ureter into the pelvis. When the ureteral sound does not reach the pelvis, direct intervention is necessary. A ureteral sound is passed as far as possible, the kidney is freely exposed, the ureter is easily found, examined, and operated on according to circumstances. According to the case one may practise ureterotomy, uretero-pyelostomy, uretero-pyeloneostomy, or, as Albarran has done in two cases, autoplasmic resection of the kidney, or to make a welt in the pelvis. If it is impossible to save the kidney, nephrectomy is in order.

(B) Purely purulent fistulæ are generally due to perinephritis. In most of these cases the rôle played by the kidney is to prevent proper drainage. For the kidney to secrete pus without urine its destruction must be very complete. If the kidney still secretes urine, then the perirenal foci of disease must be cleaned and drained; but if the kidney does not secrete urine, it ought to be removed.

(C) In uropurulent fistula Albarran begins treatment as in cases of pure urinary fistulæ. If both the urine and pus come

from the kidney the treatment is as if there was no pus; but if the pus comes entirely or in part from the perirenal tissues, measures must be taken accordingly.

In those common cases where ureteral obstruction is due to inflammatory lesions of this tube, it is wise to do a nephrostomy and *subsequently* to undertake any plastic operation on the ureter which may be necessary.

M. THOMAS JONNESCO (Bucharest) has had a case of enormous calculous pyonephrosis affecting the right half of a horse-shoe kidney. He removed the affected half, the remaining portion being healthy. The patient died from reflex anuria. At the autopsy the remaining portion of the kidney was found healthy and its ureter patent.

JOHN F. BINNIE.

INDEX TO SURGICAL PROGRESS.

ABDOMEN.

I. Recovery after Removal of the Entire Stomach for Carcinoma. By CHARLES BROOKS BRIGHAM, M.D. (San Francisco). The patient was a woman, sixty-six years of age, who had complained of pain in her stomach for one year. For two months she had vomited any solid food that she took, and therefore had confined herself to liquids and to thickened gruels, and so was able to keep her usual weight of 135 pounds.

She was a remarkably healthy woman in other respects, having a strong heart and lungs, a clear complexion, with a good deal of color in her cheeks. In February, 1898, she first came to Dr. Brigham for advice on account of the pain which she felt in her stomach. There was a hardness in the pyloric region which was painful on pressure.

On the 24th of February, 1898, under ether, an incision three inches in length was made half-way between the ensiform process and the umbilicus. The omentum was adherent to the parietal peritoneum the entire length of the incision. Once the peritoneum was opened, a hard mass was felt at the pyloric extremity of the stomach, extending over half its surface and involving its walls. The stomach was freely movable. There were no nodules in the omentum; but there were several of varying size, from two inches in diameter and less, upon, and attached to, the surface of the stomach. The tumor could be felt extending into the interior of the stomach, just beyond the middle line. The abdominal fat was over an inch in thickness, and it was necessary to enlarge the incision to seven inches in length, so that it extended from the ensiform process to a point an inch below the

umbilicus. After three or four inches of the greater omentum were tied off, work was begun on the lesser omentum; and so, by working alternately on the two omenta, rotating the stomach as was necessary, the tying off was accomplished. The most difficult part of the work was on the lesser curvature, it being in the deepest part of the wound. When both curvatures were free from omentum, the duodenum was clamped, and a ligature of silk being placed around the duodenum half an inch above the clamp, the tissue was divided by scissors between the two; the divided extremity was carefully washed in salt solution and wrapped in iodoform gauze. The stomach was then free for any desired manipulation.

As the tumor occupied already more than half the organ, with a hardness extending some two inches beyond along the greater curvature, he decided to remove the entire stomach above the cardiac orifice. The gastro-splenic omentum was tied off, the stomach held with moderate tension, and a clamp was placed just above its cardiac orifice. An intestinal clamp was then placed on the œsophagus a little over an inch higher up, and the tissue was divided between the two nearest the cardiac orifice. The œsophageal extremity was then washed and wrapped in iodoform gauze; the œsophageal clamp followed each movement of the diaphragm. The duodenum could be drawn up to the œsophagus without undue tension. As the patient's pulse had become weakened by the length of the operation, the Murphy button was used for approximation of the parts instead of a suture. One-half of a No. 3 Murphy button (fifteen-sixteenths of an inch in diameter) was then inserted in the duodenum and fixed in position. Finding that there was not room enough in the divided end of the œsophagus to apply the button, he seized the free extremity with a T-forceps and applied the clamp higher up, so that it was placed at the nearest possible point to the diaphragm. He then had an inch and a quarter of free œsophagus of equal diameter throughout, measuring an inch and an eighth

across,—the mucous coat was entirely distinct from the muscular and glided freely upon it. A fine-silk drawing suture was placed an eighth of an inch from the free extremity, and the other half of the Murphy button was applied. New iodoform gauze was packed over the bottom of the wound, and the halves of the button were pressed together. When the clamps which had been but a short time on the duodenum and œsophagus were removed, the button was drawn up about half an inch by the muscular contraction of the œsophagus. As the parts on either side of the button became distended, they were apparently of equal diameter; the tension on the parts was sufficient to keep them suspended over the iodoform gauze; no Lembert sutures were used, as the parts were in close apposition. The iodoform gauze was then removed from the bottom of the wound, the omenta arranged somewhat, and the peritoneal cavity closed with a continuous catgut suture; silkworm gut closed the abdominal incision.

The operation occupied two hours and a quarter. There was practically no loss of blood in removing the stomach; two ounces representing the entire amount, and that came from the abdominal incision and the peritoneal adhesions. The patient had an exceedingly fat abdomen, so that the incision through its walls was necessarily a long one.

At the close of the operation the pulse was 116; temperature, 98° F. Three hours later a nutrient enema of eggs, pepsinoids, milk, and broth was given, and repeated every four hours regularly thereafter for the first four days. On the second day hot water in three-drachm doses by the mouth was allowed, and on the third day the same amount of coffee or broth was permitted, the quantity being doubled on the fourth day. Pulse ranged from 96 to 100, and temperature from 99.6° to 100° F. Much restlessness, controlled by morphine. From the fifth day she was nourished for a time entirely by liquid food given by the mouth; six drachms of it given every hour, day and night; this

being the most she could take at one time. On the ninth day the nutrient enemata were resumed. On the thirteenth day a sudden relief from her sensations as to inability to take food was felt; she found herself able to swallow easily, taking three ounces and more of liquid at a time. The button is supposed to have loosened itself and passed on at this time. The nutritive enemata were again discontinued. On the fourteenth day a small stitch abscess was evacuated. From this time the convalescence progressed smoothly. Food in adequate amount was taken every three hours. The bowels moved satisfactorily. On the nineteenth day she sat up for an hour and a half; on the twenty-ninth day an abscess, which had formed under the middle of the abdominal incision, was opened, and quickly closed thereafter. At the end of six weeks, when the report of the case was made, she was quite well, enjoyed her food, and was gaining in weight. The button had not yet come to light. Never after the operation was any undigested food detected in the movements from the bowels.

—*Boston Medical and Surgical Journal*, May 5, 1898.

GENITO-URINARY ORGANS.

I. Complete Extirpation of the Bladder for Neoplasms.

By Drs. TUFFIER and DUJARIER (Paris). After reviewing the literature of the subject the authors report the case of a man, forty years of age, who, although emaciated from constant suffering, was still strong. On admission to hospital he presented all the signs of cystitis. During the day he urinated every two minutes, during the night every fifteen minutes when under morphine. Fearful pain in the hypogastrium and testicles persisted so long after micturition as to be practically continuous. Bloody and muco-purulent urine. The bladder was small, hard, smooth, and extremely sensitive. No intravesical exploration possible. The general health was good, although emaciation was rapid in the last two months. History of urinary troubles for four years.

To give relief a suprapubic cystotomy was performed Octo-

ber 6. A hard tumor was found occupying the whole left side of the bladder. Tumor was fungoid and friable. The rest of the mucosa was also infiltrated by the neoplasm, while the whole thickness of the bladder wall was invaded on the left side and the base; the disease was less marked on the right side and on the anterior wall. The disease was limited to the bladder.

On October 20 the patient was etherized, the bladder stuffed with iodoform gauze, and the Trendelenburg position adopted. An incision twelve centimetres long was made in the middle line immediately above the symphysis; the hypogastric fistula was carefully and completely separated from the abdominal walls. Two lateral horizontal incisions joined the inguinal canals to the median cut so that now the abdominal wound was J-shaped. Reflection of the flaps gave very free access to every part of the bladder. A sweep of the finger separated the anterior surface of the bladder, down to its neck and the neighborhood of the ureters, from the pubis. The lips of the vesical fistula were seized by forceps and so the bladder dragged into the wound. As the bladder was more and more liberated the forceps were made to seize the bladder wall farther and farther down in the same way as the position of the volsella is changed in hysterectomy. Thus the neck of the bladder was isolated as thoroughly as possible. Next the inferior vesical arteries and the ureters were seized in curved clamps and divided. The superior surface of the bladder was separated with the greatest care from its peritoneal covering. The bladder having been removed the vesical orifice of the urethra was touched by the actual cautery. The clamp placed on the left uretero-vascular pedicle was removed, the vessels ligated, and the ureter easily catheterized. The light vessels and ureter were treated in the same way. The catheters were fixed in the ureteral wall by a stitch and the threads left long. Small openings were now made in the rectum, and the ends of the catheters, ureters, and stitches passed through them. The catheters and stitches protruded through the anus. Traction on these

stitches was relied on to keep up contact between the ureters and the rectal wall. The threads were knotted on a forceps and so prevented from retracting. The wound was packed with iodoform and aseptic gauze. The external wound was sutured, except that a large opening was left above the pubis.

Microscopical examination showed the neoplasm to be an epithelioma.

On December 23—*i.e.*, more than two months *post operationem*—the patient was presented before the *Société de Chirurgie* in good health, and able to attend to his work.

The patient died in May, 1897. No details were obtainable.

Indications for Operation.—(1) The patient ought to be sufficiently strong to resist a serious operation.

(2) The tumor ought to be extensive, but yet limited to the bladder.

The technique ought to aim at rapidity in operating, avoidance of unnecessary destruction of tissue, and preservation, as far as possible, of an intact peritoneum. Section of the ureters may be made either before or after their catheterization. The authors think preliminary catheterization useless. The ureters lie beside the inferior vesical vessels, and nothing is easier than to clamp these structures *en masse* with a curved forceps and divide them below the clamp. After ablation of the bladder the vessels are tied and the ureter catheterized.

Section of the vesical neck must be made above a curved clamp to prevent venous bleeding. Such bleeding is difficult to stop unless the pedicle is raised, when with the aid of sight it is easy. After tying the larger vessels parenchymatous oozing may be arrested by the thermo-cautery, which at the same time destroys the urethral mucous membrane, and so prevents infection from that source. If the operation has been protracted or the patient weak, the authors advise that the ureteral catheters be left protruding through the abdominal wound, otherwise an anastomosis may be made between the ureters and whatever one

decides is the most convenient place into which they may empty. Where ought the ureters be made to empty? In women, the authors think, into the vagina, making use of Pawlik's method of converting that passage into a bladder. In man the choice lies between the abdominal walls, the urethra, and the intestine. Of these the intestine, especially the sigmoid flexure, is considered the best. Dilatation of the ureter and infection leading to kidney destruction is avoided by arranging that the opening from the ureter into the rectum remain large. In making the anastomosis the authors advise the use of Chalot's button. This button consists of a nickel-plated copper tube, in shape a cylinder, both ends of which become gradually conical. It is pierced longitudinally by a canal, which, according to the thickness of the button, measures three millimetres, two and two-thirds millimetres, two and one-third millimetres. On its surface there is a groove on which the ureter is tied by a silk thread. Once the ureter is fixed on the instrument, it is introduced into a perforation in the intestine and secured by a few stitches.—*Revue de Chirurgie*, April, 1898. JOHN F. BINNIE (Kansas City).

II. Operative Treatment of Prostatic Hypertrophy. By DR. HOFFMANN (Breslau). In Professor Mikulicz's clinic twenty-four cases of prostatic hypertrophy have been treated by some one of the "sexual operations,"—viz.:

(1) Castration (two cases): no result; one death from pyæmia.

(2) Ligation of the spermatic cord (three cases): one improvement; two unimproved; one death from hypostatic pneumonia.

(3) Section of the spermatic cord (two cases): both improved.

(4) Resection of the vasa deferentia (seventeen cases): six improved, though in four cases only very slightly; eleven unimproved, of these three died, five, twelve, and thirty days respectively after operation.

Such a mortality, contrasted with the slight improvements to be obtained from these operations, should certainly very materially restrict the indications for their performance. The results of treatment are based, not on the immediate observations following operation, but on later reports which show a very different and much less brilliant result.

The happier sequelæ immediately following operation are considerably influenced by the subjective conditions, the patient being materially influenced by the prospect of relief. Unconsciously the surgeon is apt to be likewise influenced in noting slight changes in the volume of the organ. Many cases of improvement are undoubtedly due to the rest in bed, systematic nursing, and treatment of the cystitis.

The results here given compare unfavorably with reports in general. The explanation may, perhaps, be sought in the lateness of the after observations, or, perhaps, in the unusually bad features presented by this particular group of cases. It is to be noted, however, that the material includes a considerable number of what are usually considered the more favorable cases, relatively younger subjects with succulent prostates and symptoms of short duration.—*Beiträge zur klinischen Chirurgie*, Band xix, Heft 3.

III. Renal Hæmorrhage without Organic Changes in the Kidney. By DR. S. GROSLIK. In addition to the symptomatic hæmaturia attending several diseases of the kidney, there is also an essential hæmorrhage from a kidney devoid of any anatomical changes. Such bleeding may owe its origin to inherited hæmophilia, vasomotor disturbances or unusual bodily exertions. Future investigations may reveal additional causes.

The differential diagnosis of such cases of hæmaturia is difficult only when an examination gives nothing but negative results, when enlargement of the kidney, urinary characteristics, and other symptoms pointing to an organic disturbance are

wanting. Cases of essential bleeding are so rare that they require scrupulous investigation before such a diagnosis can be established. It is of the utmost importance to obtain, if possible, a clear history of hereditary disposition to hæmophilia. In like manner nervous phenomena, hysteria, neurasthenia, etc., should be sought for. If there is a positive history of such, or if it becomes apparent that the hæmaturia was a sequel of unusual exertion, the diagnosis of essential hæmaturia is probably justified, and will be proven if a long-continued observation fails to reveal evidences of anatomical changes.

The treatment of hæmaturia due to hæmophilia will not ordinarily call for surgical interference so long as life is not endangered. In the severer forms, uninfluenced by internal treatment and tending towards a fatal anæmia, intervention should not be too long delayed. Neither simple exposure of the organ nor section through it will suffice,—nephrectomy must be performed to save life. In cases of suspected vasomotor disturbances our attitude should be somewhat different. That the process may cease under the influence of treatment or even of suggestion is no proof of its innocuousness, as hæmorrhages due to tuberculosis or tumor may cease spontaneously for a comparatively long while, only to begin anew with the same or increased severity. In the light of our present knowledge concerning vasomotor renal hæmorrhage a conservative attitude is not justified. The diagnosis should be verified by operation, not only by exposing and palpating the organ, but also by careful examination of the cut surface of its parenchyma. Should the kidney show no changes, it is sutured and replaced. Failing to obtain permanent relief, secondary nephrectomy will be in order, but the primary extirpation is uncalled for.

By subjecting all cases of obscure renal hæmorrhage to operation the many unpleasant errors attending an expectant plan of treatment may be avoided. The fact that the operation will sometimes show the absence of any organic changes should

compensate the patient for having submitted to a seemingly needless operation, which nowadays need not be attended with injurious after-effects.—*Sammlung klinischer Vorträge*, No. 203.

CHARLES L. GIBSON (New York).

BONES,—JOINTS,—ORTHOPÆDIC.

I. Interscapulo-Thoracic Amputation in the Treatment of Malignant Tumors of the Upper End of the Humerus. By PROFESSOR BERGER (Paris). In 1891 the author made the following statement: "In every case of malignant tumor of the upper end of the humerus resort should be had to amputation close to the trunk and not to disarticulation at the shoulder." The present paper is in support of that dictum. Besides giving a tabulated review of all cases published and accessible to him, the writer supports his views by the report of one case operated on by Kirmisson and one by himself. Kirmisson's case is especially interesting, because in it a large sarcoma in an infant of ten years of age had been infected and was causing very severe septic symptoms. Operation removed all of these symptoms, but there was recurrence and death seven months later.

Berger's case was a myxoma of the upper end of the humerus. It had invaded the soft parts, the triceps, the deltoid, and the axillary glands. Clinically the diagnosis made was sarcoma, but subsequent examination of the growth, after removal, showed its true nature. The interscapulo-thoracic amputation was performed, and eighteen months afterwards there was no trace of recurrence. In performing this operation Berger begins by excising a portion of the clavicle near its middle, and then tying and dividing the subclavicular vessels. This renders the whole procedure simple and safe.

Berger has collected forty-six cases in which this operation was done as a primary measure, and among these there were only two deaths. One of the fatal results was in a child of two years, who had an enormous sarcoma of the shoulder, the other

was in a woman of thirty-eight years, from whom it was necessary to resect part of the sternum and first rib in order to remove the subclavian vein and the right brachio-cephalic, which were involved in the tumor. In this latter case the operator (Bergmann) placed a ligature on the superior vena cava and packed the mediastinum.

Primary interscapulo-thoracic amputation is less grave than amputation at the shoulder-joint. Secondary operation—viz., removal of the scapula and clavicle for recurrence after shoulder-disarticulation—is a much more fatal proceeding. Here the death-rate is over 13 per cent. Ultimate results are of course more important than the immediate. Besides the cases already referred to, Berger has analyzed a series of forty-four cases which he has collected. Of this number thirteen are useless, because no report could be obtained as to their history after operation. In fourteen cases recurrence has been noted or death supervened, owing to generalization of the disease at a longer or shorter time *post operationem*. In almost all these cases of recurrence, it had been noticed at the time of operation that the neoplasm had invaded the muscles surrounding the shoulder-joint, in some cases the scapula and in one case the axillary vein. Permanent results seem to have been obtained in seventeen cases, in which the history was known for periods varying from four months to three years after operation. Reckoning as cured only such cases as remained well for one or more years after amputation, the statistics showed the percentage of recovery to be very nearly 33.

It is interesting to note the character of the tumors in cases where there has been no recurrence. Four cases proved chondromata, one myxoma, all the others were sarcomata, generally of periosteal origin. In no case of chondroma of the humerus was there recurrence, no matter the size or the extent to which the soft parts and the scapular muscles were invaded.

The author has collected twenty-three cases of secondary

amputation of the scapula where the primary operation had been disarticulation of the shoulder-joint. Among these there were only four in which recovery had been considered assured (two had been traced for only two and four months respectively), and none of the cases are considered by Berger to have belonged to the categories of sarcoma, chondroma, or such-like connective-tissue tumors.

Berger admits the existence of certain bone tumors which are relatively benign,—*e.g.*, giant-celled sarcomata, chondromata, and perhaps myxomata. If such neoplasms are distinctly circumscribed and encapsulated; if they show no prolongations into the scapular muscles or the shoulder-joint; if their histological structure has been proved by an exploratory incision and microscopic examination, made while the patient is lying prepared for operation, then resection of the humeral head may suffice. In all other cases of malignant tumor situated in the upper end of the humerus Berger thinks that interscapulo-thoracic amputation is indicated, and gives the best possible immediate and permanent results.—*Revue de Chirurgie*, October, 1898.

II. Operative Reduction of Hip-Joint Dislocations.

By DR. KARL ENDLICH (Magdeburg). In cases of old-standing hip-dislocation the choice in treatment lies between operative reduction and resection of the femoral head. Operative reduction is the ideal method, though resection has been more commonly chosen as being easier and safer. It is desirable that reposition should always be attempted before resection is resorted to. Up to the present time only ten cases are known to literature where operative reposition has given good results. Riedel has had one case which is buried under the title "longitudinal fracture of the head and neck of the femur." Its history is as follows:

CASE I.—W. P., aged fifteen years, admitted December 17, 1884. Injury three weeks ago. Left leg five centimetres shortened, flexed, and rotated inward. Because of swelling the head

could only be felt with difficulty posteriorly on the pelvis. Crepitation on motion. Diagnosis: *Luxatio femoris cum fractura capitis aut acetabuli*. December 19, 1884: Langenbeck's incision, chiselling of the trochanter. After division of the muscles the head was seen posterior to the acetabulum lying on the ilium. Head did not move when limb rotated. Closer examination showed that the presenting bone was merely a fragment of the femoral head and neck, which had been longitudinally fractured. The remnant of the torn ligamentum teres hung on this dislocated part of the head. This was removed. Now one could see that the rest of the head with its sharp edge had broken down the posterior superior margin of the acetabulum and had become displaced far back on the ilium. The anterior portion of the acetabulum was empty and normal. The sharp edges of the head were rendered blunt and reposition attempted. This was opposed by the adductors. Finally, flexion and adduction succeeded in obtaining reduction, with two centimetres of shortening. Suture; drainage; extension dressing.

Favorable wound-healing followed. By end of three months had regained ability to walk without a stick, with a stiff joint and with scarcely noticeable shortening of the limb.

June 24, 1897.—Patient is now twenty-eight years of age. Left limb is five centimetres shortened. Region of trochanter major somewhat thickened. Fair flexion of hip without pain. Abduction and rotation much limited. The shortening of the limb is compensated for by inclination of the pelvis. No noticeable limp except when walking carelessly. Can go the whole day without pain. Can ascend stairs, and although he cannot sit far back in the chair, yet he can sit well.

CASE II.—A. F., aged five years, admitted October 26, 1889; dismissed April 20, 1890. Five weeks before admission patient's left leg was caught in a wagon-wheel and he was dragged a short distance. Immediately after he was unable to walk. Much swelling of left hip. The attendant physician failed to diagnose dislocation.

On admission patient, a strong boy, showed a typical left-sided luxatio iliaca. Manipulations failed to reduce.

November 6, 1889.—Incision as if for resection. The head of the femur lay uninjured in a new bed. Reposition was possible only after division of the muscular connections of the trochanter major. The cotyloid cavity seemed rather small for the head. The tendency of the head to leave the cotyloid cavity was not great. The wound was left without sutures and without a drain. Dressings and an extension apparatus were applied.

November 28.—Wound almost healed. Flexion of 10 degrees is possible. The leg remained abducted at an angle of 20 degrees. Abduction and adduction are very slight.

March 19, 1890.—In narcosis the leg was moved, but for fear of breaking the bone not much strength was used. Subsequent daily massage and passive movements were carried out.

On May 5, 1891, the patient was seen, and the result was found to be ideal. Unfortunately, the boy died from typhoid four years later. His mother reported that he was a wild lad, and ran about, climbing trees, and jumping ditches, as if he never had had anything the matter with him.

This good result was reached because of perfect asepsis. The wound was neither sutured nor drained. The anatomical conditions are relatively good after operative reduction. There are no cavities in which blood can collect; the glutæi close the cavity where the head has lain; the glutæus medius especially, which has been loosened from the trochanter major, slips upward. No blood can collect in the cotyloid cavity. Any blood coming from the injured trochanteric muscles easily makes its way outward. The prospects for primary union are increased if the wound remains unsutured, because a closed wound makes greater demands on asepsis. The author urges that suture should be omitted after all operations on the hip-joint. When such wounds are left open there can be no retention of blood in the wound, there are no foreign bodies present, and thus healing in the deepest parts takes place with rapidity.

As good results, even under the most favorable circumstances, can hardly be expected in adults as in children, since wild youngsters, with their climbing and twisting, attain a degree of mobility impossible in their seniors, apart from the fact that roughnesses on the articular surfaces are much more readily smoothed than in adults. Cases of unreduced luxatio obturatoria are much more serious than iliac dislocations, because of the greater deformity and of the pain due to stretching of the sciatic nerve.

CASE III.—Male patient, aged nine years, admitted October 9, 1894; dismissed February 28, 1895. Injury received nine weeks prior to admission. Abduction; slight flexion; external rotation. Region of cotyloid cavity empty. Trochanter below the Roser-Nélaton line. Femoral head can be felt on the obturator foramen towards the ischial tuberosity.

October 15, 1894.—In narcosis attempts at simple reduction were made without result. A longitudinal incision was made over the trochanter. The muscles inserted on the posterior parts of the trochanter were divided, and by this means the sciatic nerve was unexpectedly exposed. The capsule was split; the cotyloid cavity was found full of connective tissue, and its anterior margin was slightly flattened. The posterior margin of the cavity was cut through to give drainage. The head of the femur was easily replaced in the cotyloid cavity. Drainage was used but no sutures.

At first there was much discharge from the wound. After some troubles with the wound had been passed through the patient was dismissed with a shortening of three-fourths centimetre on the affected side, but with ability to walk without pain.

Three years later the patient was found to have an ankylosed left hip, but was able to walk the whole day, only complaining of pain in the knee-cap. On the whole, this was an unfavorable result,—the cause of failure being suppuration and want of treatment after dismissal.

CASE IV.—Male, aged twenty-seven years, admitted August 7, 1895. Accident happened three months prior to admission.

Patient presented the usual symptoms. On August 22, 1895, so as to reach and replace the head of the femur from the inner side of the thigh, an incision was made from the symphysis along the lower margin of the gracilis for a distance of twelve centimetres downward. Through this the head of the bone was reached, as it lay in the obturator foramen with its head pointed to the descending ramus of the pubis. The articular cartilage was intact. Around the head there was a firm, tight capsule of hard fibrous tissue, containing numerous spiculæ of bone. It was impossible through this incision to replace the head, so a long Langenbeck incision was made, beginning below the trochanter major and running obliquely backward and upward towards the posterior superior iliac spine. Through this cut the cotyloid cavity was reached and found to be full of fibrous tissue, which was removed. The junction of the neck and head of the femur lay against the anterior margin of the cotyloid cavity. The head of the bone was dissected free, but could not be replaced until part of the rim of the cotyloid cavity had been chipped away when the reposition was made.

The patient was last seen in October, 1897. At this time he could flex his limb 35 degrees, adduct and abduct it through an angle of 5 to 7 degrees, and rotate it through one of 5 degrees. The movements were smooth, without crepitation, and without pain. He was able to work all day on the roads.

This good result was not obtained all at once. When he left the hospital his hip was stiff. It was only the stern necessity of providing for his family that made him endeavor to work, and his work led to the good result related.—*Archiv für klinischen Chirurgie*, Band lvi, S. 574.

III. The Anatomical Changes Produced by Forcible Rectification in Pott's Disease of the Spine. By DR. L. WULLSTEIN (Halle). The author quotes Ménard's experience

in three cases of operation on the diseased cadaver. In these cases a gap was created of from three to six to eight centimetres between the upper and lower segments of the spine; in one case an abscess was ruptured and made to communicate with the mediastinum; in *no* case was there any injury inflicted on the spinal cord or its membranes. An experiment made by von Brun caused a gap in the spine of fully eight centimetres. In a child, who died forty-eight hours after forcible *redressement*, Vulpinus found a gap of several centimetres in the line of the vertebral bodies, where there was most destruction,—viz., the tenth and eleventh dorsal.

The author's experiments were as follows:

CASE I.—Male, aged twenty-three years. Disease began when he was four years old. Before his sixth year there was temporary paralysis of the lower extremities, of the bladder, and of the rectum. Death was from pyelonephritis. The kyphosis included more than half of the dorsal and lumbar vertebræ. The most prominent part consisted of the spinous processes of the ninth and tenth dorsal vertebræ.

Under uniform but gradually increasing traction most of the deformity disappeared, its disappearance being accompanied by a crackling sound. The rest of the deformity required much direct pressure for its removal. After removal of the sternum a skiagraph was obtained, which showed a diastasis of seven centimetres and a sequestrum entirely detached from the spine. In the specimen there was found another sequestrum lying in the diastasis and loosely attached to the spinal column. When the deformity was completely corrected the diastasis was fully nine centimetres wide. In the pleural cavity there was no blood, but in the posterior mediastinum and on both sides of the spine, near the costo-vertebral articulations, under the parietal pleura, there was much blood effused. In the right intercostal space, corresponding to the greatest convexity of the spine, the parietal pleura was torn. In the region of the diastasis the vertebral bodies had

almost disappeared. The fifth dorsal and first lumbar were entirely gone; everywhere one could find the dura exceedingly rigid, thickened, and partly calcified. In the lower part of the diastasis the anterior part of the dura was torn transversely, and the cord, while uninjured, lay free. The spine was fractured between the ninth and tenth spinous processes. The spine above and below the diastasis, from the first dorsal to the fourth lumbar vertebræ, contained old and new foci of tuberculous disease, not only in the bodies of the vertebræ but in the intervertebral cartilages. Above the diastasis a large abscess was present in the muscles anterior to the vertebræ. Another abscess was found below the diastasis anterior to and to the side of the spine. In spite of their great size, neither of these abscesses were ruptured during the operation.

CASE II.—Female, aged six years; duration of disease, one and a quarter years. Temporary paralysis of lower extremities. Death from pulmonary tuberculosis. The spine showed two curves, one sharp, in the region of the fifth and sixth dorsal vertebræ, the other not prominent, in the region of the third and fourth lumbar. Correction was exceedingly easy under light traction with no direct pressure. Examination showed two diastases produced. The upper being four centimetres, the lower three centimetres. In the upper diastasis the dura was exposed, rendered exceedingly tense, but remained uninjured. About five centimetres to the left of this diastasis there was an unruptured abscess. An abscess, the size of a goose-egg, remained unruptured in the right psoas muscle. In the upper diastasis itself there were remnants of an abscess capsule, which must have been divided during the preparation. The fifth and sixth dorsal vertebræ were totally, the fourth and seventh partially, destroyed. In the lower diastasis the third and fourth lumbar vertebræ were partly destroyed, the left half of the fifth entirely. The posterior half of the spine was completely fractured between the spinous processes of the fifth and sixth dorsal vertebræ. Between the sixth and seventh vertebral arches the softened spinal cord was

so torn and stretched that it was only by the greatest care that it could be removed without being completely torn through.

From the experiments related Wullstein draws conclusions unfavorable to forcible rectification in Pott's disease, and recommends an apparatus, which he has devised, for keeping up continuous traction for a long period of time.—*Archiv für klinischen Chirurgie*, Band lvii, p. 485. JOHN F. BINNIE (Kansas City).

IV. Treatment of Joint Tuberculosis and Cold Abscesses in the Breslau Clinic. By DR. A. HENLE (Breslau). In recent years conservatism has been the rule in the treatment of tubercular joint-disease in Professor Mikulicz's clinic. An exception is, however, made of tuberculosis of the knee in adults, which is usually subjected to a resection of the joint.

With the exception of hip-disease, treatment usually begins with a course of venous stasis (Bier's method), its effects being carefully noted. At the same time appropriate orthopædic apparatus is applied when needed,—abnormal positions are corrected and the joint is put at rest. Within eight to fourteen days the majority of the cases show a considerable diminution of pain, and the iodoform treatment is begun. Six to ten cubic centimetres in children, fifteen to thirty cubic centimetres in adults, of iodoform-glycerin, 10-per-cent. solution, are employed as intra- and periarticular injections. Cold abscesses are aspirated and filled with iodoform-glycerin so soon as the diagnosis is made, in order to anticipate perforation of the skin. The parenchymatous injections are repeated in eight or fourteen days, but a longer interval—four to eight weeks—is allowed to elapse before repeating the process in the joints and abscess cavities, as not till then will it become evident whether or not the treatment needs to be repeated. The intervals between the parenchymatous injections are also prolonged according to the amount of local and constitutional reaction which they provoke. The number of injections varies with the severity of the case, but these must be continued till all of the apparently diseased tissue and the whole

joint and adjoining structures have become "iodoformized." When this point seems to have been reached, a period of four to eight weeks is allowed to intervene, the patient meanwhile being subjected to the most valuable hygienic measures available. At the end of this time, if there is any visible return of the disease, treatment is instituted *de novo*.

During this whole period of treatment, with the exception of two to three days after the injections, the venous congestion is continued, being applied, when possible, fourteen to eighteen hours daily. The time is gradually shortened as the conditions improve; but the treatment is not entirely discontinued till two or three months after a cure has apparently been obtained.

If a cure is not effected, but, on the contrary, there is an increase in the severity of the symptoms after a course of iodoform injections and venous stasis, appropriate operative interference is manifestly indicated. Such operations, with the exception already noted, have been required with comparative infrequency in this clinic.

Histories of 333 cases are given, as also sixty-seven tables showing the results of treatment, divided into groups according to condition, locality, treatment, and other important factors.—*Beiträge zur klinischen Chirurgie*, Band xx, Heft 2-3 und Supplement Heft.

CHARLES L. GIBSON (New York).

V. The Iodoform Treatment of Tuberculosis of the Wrist-Joint. By DR. O. BRIEGEL (Tübingen). Thirty-nine cases thus treated in the Tübingen clinic, up to 1895, have lately been investigated with regard to the end result of this form of treatment. In the fungous forms two to eight cubic centimetres of 10 to 20 per cent. iodoform oil were injected into the joint and fungosities through one or more punctures. In distended joints and periarticular abscesses the fluid or pus was withdrawn by aspiration, and ten to thirty cubic centimetres of the solution injected. The process was repeated at intervals varying from four days to five weeks. Under this treatment twenty-four of

thirty-nine cases were permanently cured; three were not cured; three required operative interference; seven died. The functional results are surprisingly good, in more than half of the patients they were almost ideal.

Iodoform treatment of tuberculosis of the wrist is by far the most successful method. In earlier life a beginning fungous lesion, in the absence of tubercular foci elsewhere, gives an almost certain promise of cure within a relatively short space of time. Even in the severer forms, with abscesses and sinuses, a large proportion can be permanently cured. The method possesses the advantage of simplicity, and can be successfully carried out by the general practitioner, provided he uses proper aseptic measures. The results are generally good, and in a large proportion of cases the form and usefulness of the member are so perfectly restored that it is often difficult to identify the joint originally affected. The danger of a return of the disease is very slight.—*Beiträge zur klinischen Chirurgie*, Band xx, Heft 1.

CHARLES L. GIBSON (New York).

NERVOUS SYSTEM.

I. Primary Focal Hæmatomyelia from Traumatism.

By PEARCE BAILEY, M.D. (New York).—From the general class of lesions in the spinal cord, occurring as the results of injuries to the spine, it seems now possible to separate a group of cases which, in point of frequency, symptoms, and prognosis have important surgical relations. Bailey describes cases in some detail. They result chiefly from sudden forced flexions and extensions of the head and neck, and the lesions, which are hæmorrhagic, are confined to the cervical and upper dorsal regions. They differ from the commoner varieties of spinal cord injuries in that the vertebræ are not fractured or dislocated, in that the prognosis, both as to life and as to recovery, is relatively favorable, and in that the symptoms referable to the spinal cord are much more elective than in transverse lesions. The definition proposed to include these cases is primary focal hæmatomyelia.

The word primary indicates that the bleeding originates from force exerted directly upon the spinal cord, without the intervention of a fracture of the spine. Primary traumatic hæmatomyelia is thus differentiated from the hæmorrhages which frequently complicate crushes of the spinal cord, and which should be called secondary. In the primary variety demonstrable lesions of the bones to help explain the symptoms are absent, and the hæmorrhage accordingly constitutes the chief lesion, being uncomplicated by the general mutilation of the cord, which is unavoidable when pressure is exerted upon it from the outside, as is the case when protecting structures are broken down. The rest of the name proposed for this variety of injury explains itself. Focal, in contradistinction to disseminated, indicates that the hæmorrhage is localized; hæmatomyelia, that it is into the substance of the spinal cord. Autopsy records show that this particular variety of injury is by no means infrequent, it having been found once in a series of seven fatal cases of general spinal cord traumas, and twice in another series of twenty-two cases. But since only a small proportion of the patients die, primary focal hæmatomyelia certainly occurs in a higher percentage of all cases of spinal injuries than that indicated by post-mortem evidence. That the nature of the lesion has not been more frequently recognized by clinicians is due to the fact that the one clinical symptom which is absolutely diagnostic has only recently become known. The lesion itself consists of a focal hæmorrhage in the gray matter of the lower cervical and upper dorsal cord. The hæmorrhage is very constantly confined to the gray matter; in its extensions it goes up and down the gray columns in preference to bursting into the surrounding white columns. Demonstrable deformities in the bones, at least such as would affect the spinal cord, are absent. The only as yet observed causative agents are the already-mentioned over-bending of the neck and pistol-bullets which lodge in the vertebræ.

The symptoms of this affection present a certain range of variability, dependent upon the degree and situation of the hæm-

orrhage. If the clot is a very large one, it may burst beyond the gray matter and totally destroy the spinal cord, so that death ensues rapidly. In the majority of cases, however, the clot affects only a small portion of the cord; it is then that the distinctive clinical feature of the affection becomes manifest. This feature consists of what is called a dissociated anæsthesia,—that is, a lowering or obliteration of one or two of the three chief varieties of cutaneous sensibility, while the other one or two varieties retain their normal acuity. In primary focal hæmatomyelia the dissociation occurs so that the sensibility to touch is unaffected, but there is a diminution or loss of the power to differentiate between heat and cold (thermoanæsthesia) or to feel pain (analgesia), or both these functions are affected. This symptom results from the lesion being confined to the central gray matter, the part of the spinal axis which presides over the sensory functions of temperature and pain. In primary focal hæmatomyelia, therefore, tactile sensibility remains normal. Analgesia is usually less profound, and is less constant, than thermoanæsthesia. (Thermoanæsthesia is easily demonstrated by means of two test-tubes, one filled with hot, the other with cold water.) The sensory changes occur in the same areas as in other spinal cord injuries, depending upon the segment affected.

This peculiar variety of anæsthesia is the chief distinguishing characteristic of the affection under discussion. The other symptoms, such as paralysis, sphincter defects, changes in reflex action, etc., have certain variations from those encountered in cord lesions from fractured vertebræ. They are sufficiently individual, in nature, association, and evolution, to make primary spinal cord hæmorrhage from trauma a distinct and early recognizable clinical type. For a free discussion of these symptoms the reader is referred to the original article. It is our purpose here merely to call attention to the necessity of correct diagnosis in these cases for the purposes of prognosis and treatment. It seems well established that they offer the best prognosis of any traumatic injury to the spinal cord. Cases are on record in

which, after an initial paralysis of all four extremities, almost perfect recovery occurred in a few weeks. One patient, totally paraplegic at first, could stand alone after seven days. Another, with almost complete paralysis in the right arm and general weakness in the right leg, resumed his occupation as fireman of an engine in six months after the accident. Bailey reports the case of a man, both of whose legs became paralyzed as a result of a fall through a hatchway, who was able to resume work in two months; another in which the patient, after complete loss of voluntary motion and sphincter control, walked up four flights of stairs unassisted forty-six days after the receipt of his injury. This rapid recovery is explained by rapid absorption of the blood. Poured out into the central gray matter, it interferes only indirectly with the long fibre-courses in the spinal cord; and its effect of permanent destruction is small. If the clot is sufficiently extensive its effects may, of course, be as disastrous as those brought about through bone injury; such a result is, however, the exception rather than the rule; in the larger number of cases the hæmorrhage is circumscribed, and the symptoms, although they may be alarming at first, rapidly subside, so that not only is life spared, but useful recovery is established.

Operative interference is, of course, not to be thought of in these cases. The lesion is within the spinal cord, and so beyond the reach of the knife; and while it is impossible to say that the bones or intervertebral cartilages escape all injury, such injuries are not apparent, and the nature of the symptoms referable to the nervous system indicate plainly that the bone-lesion, if one exists, is not the cause of the nervous one. Consequently, there can be no question of operating for the relief of pressure, and, indeed, it seems possible that some of the brilliant results reported as following upon operations for traumatic spinal paraplegia may have occurred, not by means of the operation, but because the lesion was primary focal hæmatomyelia, a condition permitting of spontaneous repair.—*Medical Record*, November 19, 1898.

REVIEWS OF BOOKS.

ON THE ORIGIN AND PROGRESS OF RENAL SURGERY, WITH SPECIAL REFERENCE TO STONE IN THE KIDNEY AND URETER; AND TO THE SURGICAL TREATMENT OF CALCULOUS ANURIA, being the Hunterian Lectures for 1898, together with a Critical Examination of Subparietal Injuries of the Ureter. By HENRY MORRIS, M.A., M.B. (Lond.), F.R.C.S., etc. Philadelphia: P. Blakiston's Son & Co.

This little volume is the fruit of long experience. It theorizes little, but gives many facts, together with well-reasoned conclusions. A series of 267 operations on the kidney, by one surgeon, is, perhaps, unique. The author has had an advantage over most surgeons in the wealth of his material. This has been utilized to elucidate a subject in many of its details often obscure. Two hundred and sixty-seven operations in a single branch of surgery entitle the operator to our respectful attention, and excite in the reader anticipations of a profitable evening by the hearth-stone with the book for a companion. As the work is laid aside, however, one is a little disappointed, and is left with the impression that the author has held much more in reserve. Thus the work seems incomplete, and the reader comes with a bump against the lengthy tables which close the volume as against a door which we expect to be open but find closed, when we try the latch. We regret that, as we turn to the title-page, it gives us no ground to expect a fuller treatise on the surgical affections of the kidney, as the author expressly restricts his subject to calculous disorders. There is a digression in the shape of a chapter on subparietal injuries of the ureter, which is of much interest. That the author has been able to collect but twenty-three cases of this lesion is sufficient proof of its rarity.

The first chapter in the book is historical, and forms an interesting record of the successive advances in the surgery of the kidney. The earlier operations were attempted only on kidneys which were known to be diseased, until, in 1880, the author cut down upon a normal kidney, incised its parenchyma, and extracted a small calculus. This operation may be said to be the foundation of the modern conservative surgery of the kidney; for if it be true, as the author says, that the smallest calculus in the renal pelvis is a constant source of danger to the kidney and capable of causing its ultimate disorganization, it is evident that the earlier operation which removes the source of irritation is truer conservatism than a delayed nephrectomy. The uncertainty of the diagnosis of such conditions has stood in the way of earlier operations of this sort, and it is with pleasure that we find in this work principles laid down which will aid the surgeon. It has long been a sort of bugbear that the pain of a diseased kidney might be referred to the other side, and where there was no other evidence at hand, particularly that to be elicited from the bladder or urine, a prudent surgeon has been reluctant to subject the patient to an operation for what is sometimes only an occasional disability. Morris disposes of this old dogma in the following words: "There is not, so far as I know, any case on record in which there is completely satisfactory evidence of symptoms on one side being caused by a stone in the kidney on the opposite side." As a corollary to this proposition the author adds, "The kidney, which ought to be first explored, is the one on the painful side." The discussion on this subject is full of force and weight, and likely to give those of us with less experience than the author confidence in doubtful cases. In the paragraphs on small renal calculi the author calls attention to their dangers, and narrates a case of anuria and death from the impaction in the lower part of the ureter of three little calculi, weighing altogether one grain and a half. There follows an interesting discussion on the subject of calculous anuria, with remarks on differential diagnosis. The chapter closes with a

description of the operative technique involved, in which Kelly and Fenger, of this country, are given due credit for their work. A full account of the twenty-three cases of injury to the ureter closes what may be termed the didactic part of the book. The closing chapter contains full tables of the author's 267 cases of renal surgery, together with a table of forty-nine cases of calculous anuria by different operators, seven of these cases, however, belonging to the author. These tables will be of use to the statistician and the writer of future papers on renal surgery. The book itself is a welcome addition to the literature of the subject and contains much that will be new to many surgeons. Our chief regret is for its brevity.

ALGERNON T. BRISTOW.

CHIRURGIE DE L'UTERUS. Par HENRI DELAGÉNIÈRE, Ancien Interne en Chirurgie des Hôpitaux de Paris. Large 8vo, pp. 468; Paris, 1898. Institut de Bibliographie scientifique.

In this volume the aim of the author has been to assemble descriptions of all the operations practised upon the uterus, not only those practised by the author or approved by him, but all that have been proposed by surgeons working in the field of uterine therapeutics. The author in his preface states that he has endeavored to preserve a scientific impartiality in presenting the different procedures, avoiding criticism, desirous under the circumstances to discharge rather the *rôle* of an historian, and to leave to the reader to form his own opinion as to the merits of each essay in technique. The book opens with an account of the operations upon the ligaments of the uterus. Next follows the operations done on the non-pregnant uterus, classified according to the method of approach,—abdominal, vaginal, combined, or from the direction of the sacrum. Lastly, the operations on the gravid uterus receive attention. Each operation is made the subject of a special chapter, in which technique is described with special detail. The plan, as above described, has

been followed out faithfully by the author, and the result is a volume of interest and value as a record of the many and varied operative attempts which it has gathered together and preserved. Most of these already have only an historical interest. The suggestions of French surgeons naturally find a prominent place in the book, which fact will make it all the more valuable to the American or English reader, who will find in it placed at his convenient disposal a complete digest of French operative efforts upon the uterus.

LEWIS S. PILCHER.

TEXT-BOOK UPON THE PATHOGENIC BACTERIA. By JOSEPH MCFARLAND, M.D., Professor of Pathology in the Medico-Chirurgical College of Philadelphia, etc. Second edition, revised and enlarged. Philadelphia: W. B. Saunders.

No extended comment is called for on this most excellent work. The appearance of a second edition thus early is sufficient proof of the popularity of the book, as the new material it contains is indicative of the rapid strides of the science it treats of. Dr. McFarland has adhered to his previous line of treatment, and while new chapters have been added and former ones expanded, the scope of the work remains unchanged,—a text-book and laboratory manual.

The first half of the book deals with general principles and technic; the second takes up in detail the special bacteria of disease. An introductory chapter on the history of bacteriology reads almost like a novel, the narrative style of the author being particularly pleasing. Immunity and susceptibility are treated of at length, the theories of exhaustion, retention, phagocytosis, humors, and antitoxins, each receiving consideration, and being each condemned as not entirely adequate. Dr. McFarland does not advance a theory of his own, but takes refuge in the famous position of Sir Roger de Coverly and says, "Much may be said on both sides."

Under the head of sterilization and disinfection formaldehyde receives mention, but only one of the many forms of generators is spoken of, and that not by name. The subject is one of such practical importance that many practitioners would be grateful for a word of advice upon the choice of apparatus. Following Welch, 1-500 bichloride used after careful scrubbing, and immersion first in potassium permanganate and then in oxalic acid is advised as an efficient preparation of the hands for operative work. The method of Lockwood, of St. Bartholomew's,—that in which biniodide of mercury is advised,—is the only other receiving mention. Boiling in cumol is advised for catgut. Some advice on the disinfection of the sick-room appeals especially to those who believe in cleanliness and simple surroundings.

Among the specific bacteria—the pus-producing ones, including the gonococcus and the somewhat questionable diplococcus of mumps being treated of under one chapter on suppuration—a most valuable and interesting chapter is presented on tuberculosis. Practical hints on sanitation and prevention are noteworthy, and might be urged with even greater force.

Glanders, leprosy, and syphilis follow, the varying results obtained by Lustgarten and van Niessen in the last-mentioned disease being compared. Actinomycosis, madura-foot, farcin du bœuf, and rhinoscleroma complete the section on the chronic inflammatory diseases.

In the section on toxic diseases, tetanus receives first mention. The method of preparing its antitoxin as well as the disappointing results are noted. Diphtheria is taken up in the same full, practical, and interesting manner, while about an equal space is devoted to the spirillum of cholera, with its related varieties. Haffkine's work on artificial immunity is summarized with the conclusion that, while progress has been made, the results "are not glitteringly successful."

The articles on pneumonia, anthrax, and typhoid are able,

the considerations on Widal's reaction and its application being particularly interesting. Sanarelli's valuable contributions to the bacteriology of yellow fever receive extended mention, as do the researches of Yarsin and Kitasato on the bubonic plague. Grippe, measles, some of the diseases peculiar to the lower animals, as hog- and chicken-cholera, mouse septicæmia, etc., malignant œdema, and whooping-cough are among the bacterial diseases mentioned, besides a considerable number of the less common ones.

The chapters on whooping-cough, mumps, yellow fever, hog-cholera, and swine plague; those describing the bacillus *aërogenes capsulatus* and *proteus vulgaris*; and the method of determining the value of antiseptics and germicides, and the thermal death-point are new. Mention must be made of the numerous excellent plates with which the book is embellished and the handsome appearance of the volume.

HENRY GOODWIN WEBSTER.

AN AMERICAN TEXT-BOOK OF GYNÆCOLOGY. Edited by J. M. BALDY, M.D. Second Edition. Philadelphia: W. B. Saunders, 1898.

The American text-books are too well and too favorably known to require extended review, and this new edition of the Text-Book of Gynæcology is no exception in point of general excellence. The volume is uniform in size and binding with the others of the series, and the press-work is of the same high order. Over forty of the older illustrations have been replaced, and the numerous plates, colored and half-tone, are by no means the least valuable portion of the work. As they are all particularly designed to be explanatory of technic, as described in the text, they form in themselves a ready key to the subject under treatment. The list of contributors includes J. M. Baldy, Henry T. Byford, Edwin B. Cragin, James H. Etheridge, William Goodell, Howard A. Kelly, Florian Krug, E. E. Montgomery,

William R. Pryor, and George M. Tuttle, all names widely known and highly esteemed.

The opening chapter is a comprehensive one on pelvic examination. The technique of gynæcological operations follows, including the preparation of the patient, of the operator, of the instruments, and of the ligatures and dressings. The permanganate and oxalic acid disinfection is given preference over the simple bichloride soaking for the hands, and linen operating suits are advocated. Silk is advised for intrapelvic ligature, and sterilization in cumol for catgut, although the danger from that inflammable fluid is frankly stated.

A chapter on menstruation follows, and sterility is considered separately. A chapter on abnormalities, taken with the illustrations, is sufficient to fill even the professional mind with horrors. Tuberculosis is treated of in an able chapter, followed by an extended paper on non-malignant diseases of the vulva and vagina.

An important chapter is the one on inflammatory diseases of the uterus. The anatomy is well brought out, especially the arrangement of the lymphatics. Simple endometritis is first considered, the benefits from treatment being especially emphasized. Stem pessaries, caustics, and the like, come in for sharp condemnation, as they should. Endometritis of the graver type receives careful consideration, thorough curetting being urged as affording the surest means of relief. Under lacerations, silk-worm gut is advised for the repair of the cervix, and Emmet's operation for lacerations of the perineum, the explanatory diagrams being many and lucid.

Retroposition of the uterus, considered at some length, forms a most interesting section. It is advised to attempt replacement by either simple bimanual manipulation, instrumentation, or operation, employed in the order named. The limitations of Alexander's operation are pointed out, though possibly it has a broader field than is here credited to it. Ventral fixa-

tion is advocated, too firm union to the abdominal parietes, however, being deprecated, as threatening trouble during pregnancy. The remainder of this interesting chapter is given up to the mechanics and treatment of prolapsus.

A most valuable article on malignant disease follows, succeeded by one on benign neoplasms. The chapter dealing with hysterectomy has been rearranged and amplified. Its illustrations are particularly good. The succeeding chapter deals with pelvic inflammation and its relief. "Treatment" and galvanism are decried, the common-sense rules of modern surgery being brought to bear in their stead. The section deals fully with the technique of vaginal hysterectomy. Ectopic gestation receives careful discussion in a well-written chapter. Valuable articles on diseases of the ovaries, of the urethra, bladder and ureters, and on post-operative treatment complete the volume.

By way of comment, it is a natural question to ask, why the articles remain unsigned. While shrewd guesses as to the source of two or three sections are possible, a large number of readers would be gratified to know to whom credit is due for each.

HENRY GOODWIN WEBSTER.

CORRESPONDENCE.

ENTERORRHAPHY WITHOUT MECHANICAL ACCESSORIES.

Editor ANNALS OF SURGERY:

SIR,—My attention has been drawn to a paper on “Enterorrhaphy without Buttons, Plates or Rings,” by Dr. John I. Skelly, published in the September number of your journal. That paper contains an account of a method of enterorrhaphy the principle of which consists in the removal of a collar or ring of mucous membrane from the distal end of the divided intestine, the placing of the proximal end inside the denuded distal, and the fixing of it there by sutures, the whole proceeding being effected without any artificial aid, such as buttons, plates, or rings.

Of this operation I have had some experience, both on the cadaver and the living subject. While not prepared to claim for it all that Dr. Skelly does, I believe in certain cases (but only in certain cases), where enterorrhaphy is necessary, the method offers at once greater speed and greater security than any other. The cases I refer to are cases which present the following two features: congestive thickening of the wall of the bowel, and a large accumulation of fæcal matter, which must subsequently pass over the line of union. To these, in many cases, is added a third feature,—viz., a wide difference in size in the lumen of the bowel above and below the obstruction, due to distention of the proximal portion. For cases presenting this feature a modification in the operation (which need not be described here) makes the method very suitable.

From perusal of Dr. Skelly's paper it would appear that he is under the impression that the method is new or original. That

being so, and in view of the enormous difficulty in keeping abreast of current surgical literature, it may not be amiss to draw attention to the following facts. The description of the method of enterorrhaphy, which Dr. Skelly has been led to practise and publish, is practically identical with the method I have for some time practised for such cases as are indicated above.

The operation was described to the Glasgow Medico-Chirurgical Society on January 17, 1896, and a brief account of it was subsequently published in the *Glasgow Medical Journal* and in the *Transactions of the Glasgow Medico-Chirurgical Society*. At the meeting of January 17, 1896, I exhibited certain diagrammatic sketches of the steps of the operation. These were made for me by Dr. J. Campbell Maclure, of Glasgow, and are practically identical with those now published by Dr. Skelly. In practising the operation I at first employed just such looped sutures as Dr. Skelly describes and figures. As will be seen from my published accounts of the operation, I have latterly made use of continuous suture as being more speedy. At first, also, I either roughened or removed (as Dr. Skelly describes) the serous coat of the proximal end. Latterly I have come to regard this as an unnecessary consumption of time, and have been able to afford actual demonstration of the fact that the serous coat of the proximal end readily unites with the bared muscular coat of the distal.

Further, as may be seen from a note which I subsequently appended to the account of method in the *Transactions of the Glasgow Medico-Chirurgical Society*, Robinson, of Toledo, carried out experimentally, in the dog, an operation which embodies the principle of this method. This he had published in 1891, and at the time of my first publishing I was unaware of this." The operation he carried out in the dog differs from that I have practised in man merely in two details,—(a) he used a rubber tube-bobbin, I employ no artificial aid; (b) he secured the intestine by a single row of sutures, I make use of two rows, for greater security.

JAS. H. NICOLL (Glasgow).

ON THE MANAGEMENT OF ACUTE TRAUMATIC PNEUMOTHORAX.

BY RUDOLPH MATAS, M.D.,

OF NEW ORLEANS, LA.,

PROFESSOR OF SURGERY IN THE MEDICAL DEPARTMENT OF
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THAT the sudden admission of air into the normal, healthy pleura, whether it occur accidentally or as the result of deliberate purpose, in the course of an operation on the chest, is often a source of great peril to the patient and always of profound anxiety to the operator, cannot be doubted. It is, not, of course, as was feared in the days of old, that there is any risk of contamination from the air itself; nor is it because a little air has entered and there is perhaps a *partial* collapse of the lung, but it is because of the great shock with cyanosis and other evidences of defective oxygenation of the blood—often culminating in death on the operating-table, which follow when a *large* opening is made in the pleura—that has led the surgeons of all times to dread the production of traumatic or surgical pneumothorax as a great evil.

The entire catalogue of experiments on the lower animals for the purpose of studying the possibilities of lung surgery proves that one of the most serious obstacles to successful experimentation is the great mortality among animals from the immediate, often instantaneously fatal, effects of air in the pleura and pulmonary collapse. These experiments have proved that, while it is quite possible for animals to live with only one lung, the operation is of the gravest possible character and fails either primarily from the shock of the pneumothorax or secondarily from septic causes.

Glück, for instance, who operated in 1881, performed pneumotomy on six dogs and fourteen rabbits; only two of the latter survived and all of the dogs died. There was always immediate cyanosis upon entering the pleura, and death, in the majority of the animals, was from this cause. The same kind of evidence is furnished by Block (1881), Marcus (1881-82), Schmid (1881), and Biondi (1882), whose experiments were by far the most successful, scientific, and complete. He notes that the general mortality was chiefly from this cause. For instance, he operated on five dogs and lost four, death occurring immediately upon opening the thorax or following a few hours after, without any apparent cause other than dyspnoea and apnoea.

The same testimony with a few variations is furnished by Zakharwitch, De Forest Willard, W. Le Moyne Wills, Pourrat and Rodet, by Tuffier (1896), and by the last contributors on the subject, Quenu and Longuet (1896). They state that "in fifteen of our experiments in which the pleura was opened freely we constantly observed an intense dyspnoea; twelve of these dogs died of asphyxia while on the operating-table, or five minutes after, death coming on in a manner that completely excused the anæsthetic. But in some dogs the opening of the pleura is a much graver procedure than in others, or than in man, on account of an anatomical peculiarity which had been first referred to by Block, and is again insisted upon by Quenu and Longuet,—namely, the free communication that exists, as a normal condition, between the pleuræ, at a point over the tendinous centre of the diaphragm where the two serous sacs meet. All of these animals infallibly die when the pleura is opened, for obvious reasons. This is a fact which cannot be overlooked in animal experimentation. Nevertheless, whether this communication exists or not, acute pneumothorax in dogs and other lower animals is always a condition of the most serious character.

That in man acute traumatic pneumothorax, with pul-

monary collapse and its attendant shock and asphyxia, is the rock that obstructs the otherwise open channel of the thorax, is also abundantly proven by clinical demonstration and experience; though it must be admitted that there are, at times, exceptional examples of tolerance that are surprising.

With the exception of a few instances that are scattered here and there in the literature of surgery, the deliberate opening of the uninjured or normal pleura for the relief of intrathoracic conditions or in the course of the extirpation of parietal neoplasms was a thing practically unknown until the middle of this century. A notable exception is that of Richerand, who in 1818 resected three inches of the sixth and seventh ribs with the attached pleura while removing an extensive tumor of the breast. Pneumothorax and collapse of the lung followed with serious respiratory and cardiac disturbances which persisted threateningly for some time, notwithstanding the fact that the opening in the chest was immediately closed with large compresses. That the patient survived the operation is most creditable to a period when there were neither anæsthetics nor antiseptics to help the surgeon.

Dieffenbach's admonition "to stop at the pleura" was religiously observed until comparatively recent years by the vast majority of surgeons when attempting the extirpation of tumors of the thoracic parietes.

"It is curious to notice," says J. Curt (quoted by Longuet and Quenu), "how in Germany (where some of the most daring operations of this kind have been performed) the ablest surgeons condemned the removal of the tumors of the chest walls that might involve the pleura.

"Bardeleben, Stromeyer, Albert, Heinecke pronounced themselves against these operations; Roser recommended long meditation before undertaking the removal of any tumor of the chest that might involve the pleural serosa. Billroth himself in 1887 declared that he was not partial to the

extirpation of thoracic neoplasms." Subsequent events have shown that, while great progress has been accomplished in a better appreciation and control of septic conditions and better results have been obtained for this reason alone, the dangers from pneumothorax remain practically an unchanged factor in the mortality.

The evidence furnished on this point by Quenu and Longuet, in their very recent and valuable paper on thoracic growths (May, 1898), from which we have gathered the preceding historical data, is very conclusive and to the point. It is based upon the analysis of thirty-four reported cases in which the operations involved the pleura. They classify the manifestations that have been observed by operators, whenever the pleura has been opened in thoracic resections, into three categories: (1) Slight manifestations, (2) symptoms of moderate, medium, severity, (3) very grave and fatal manifestations.

(1) Among the slight accidents we note irregular respiration and weakening of the pulse (Vautrin). Sudden fall in the pulse.—in this case the pericardium was also torn (Allsberg). Noisy respiration (Tietze).

(2) Upon opening the pleura the pulse suddenly weakened and fell; the respiration became so irregular that the anæsthetic had to be stopped. After the operation the dyspnoic symptoms continued (Fischer and Kolaczek). Maas noticed that when the pleura was opened the pulse at once fell from 80 to 60; became very small and the respiration very slow. Dyspnoea persisted in this case ten days. Similar symptoms occurred in Richerand's early case of 1818, already referred to.

(3) *Very grave, and at times fatal manifestations.* Leisrinck (1880) opened the pleura, and, as he did so, the patient fell into a state of collapse; the pulse became weak and small; the respiration shallow and ineffective; faradization of the phrenic; nevertheless patient succumbed a few days after. Weinlechner (1880) records "that from the moment

the pleura was opened the respiration became so labored and irregular that the attendants gave up the patient for dead. He revived a little, but the dyspnoëic and collapsed state continued until death, which came on a few hours after." Witzel (1890) observes that "with the first tear in the pleura, which was immediately plugged with a tampon, the respiration became accelerated, and when the thoracic fenestrum was completed, the dyspnoea was so intense and the face turned so blue that for two or three minutes we experienced the greatest anxiety." Vautrin (1891), in another case than that previously referred to, writes that "in tearing the pleura the air rushed in noisily and the operation had to be immediately suspended; the patient fell into repeated syncopal spells and the anæsthetic (chloroform) had to be discontinued; the pulse did not rally until five minutes after. Müller (1888) opened the pleura, and at once the patient fell into a collapsed state with imperceptible pulse and arrested respiration. The condition was improved when the opening in the chest was closed; but the moment air was admitted, collapse returned. This experience was repeated several times, and always with the same result, until the opening was sealed permanently." Quenu (1896) reported a similar case in which the pulse and respiration failed as shown by spasmodic breathing, cyanosis, "black" tongue, "compelling us to finish the operation in great haste." Not until the pleura had been closed did the breathing improve, though the patient never recovered fully, and died from shock on the third day. König, who has been prominent among the few who regard the fears of surgical pneumothorax as exaggerated, himself lost a patient from this very cause. Tietze (1880) reported a pleurotomy for parietal tumor with fatal results from the same cause, on the second day. Zerubin Ivan (1891) and Bardeleben (1890) report alarming symptoms in two cases in which the collapse of the lung was only partial owing to adhesions. C. Bayer (1897) nearly lost a patient while resecting the chest for a

tumor, but prevented further collapse by drawing the lung out and suturing it to the chest wall.

Last year my colleague at the Charity Hospital, Dr. F. W. Parham, made a rent in the pleura nearly five inches long while excising an osteosarcoma of the ribs (third, fourth, fifth right ribs). Complete pneumothorax and collapse of the lung, accompanied by alarming and critical symptoms, immediately followed. An attempt was made to overcome the collapse and asphyxia by suturing the pleura, which had been separated by previous dissection; but the sutures tore through, and thus failed to seal the chest, which was finally accomplished by obturating the opening with a musculo-pectoral flap. Gauze packing applied in the wound as a drain also helped to seal it, and the patient then improved. Cyanosis and other respiratory symptoms persisted for several hours, but gradually subsided. Convalescence, though slow from sloughing of the flaps, was ultimately followed by complete recovery without serious pleural complications.

The writer has on three occasions, while performing transpleural hepatotomy for abscess of the liver, opened the pleura low down in the chest (after resection of the ninth and tenth ribs) on a level with the lower edge of the lung. Air rushed in, but serious pneumothorax was prevented by plugging immediately with iodoform gauze and then suturing the diaphragm to the chest wall with deep sutures. No bad after-effects were observed in these cases.

Tuffier, in relating his experience in the treatment of pulmonary abscess (International Congress of Moscow, 1897, "*Chirurgie du Poumon*," p. 11), brings out all the dangers of pneumothorax in operations on non-adherent lungs in a very strong light. He reports eight cases of septic lesions of the lung (abscess, gangrene, bronchiectasis, tuberculosis, etc.) in which complete pneumothorax occurred during the operation; in two death was immediate; one died a few hours after the operation; two recovered (suppurating foci not opened); one recovered (focus opened four

weeks later). In all, the pneumothorax, from lack of adhesion, was the worst complication and the essential obstacle to successful operation. Doyen, Thiriar, Ohler, Truc, and many others could be quoted with narratives that are thrilling with tragic details and narrow escapes from the dangers of acute pulmonary collapse.

It is the risk of acute pneumothorax that has led surgeons like Krausse and Tuffier to advise the detachment of the pleura to facilitate the *extra*-pleural exploration of the lung, just as the detachment of the peritoneum, to facilitate the extraperitoneal exploration of the abdominal cavity, was advised at a time when the risks of peritonitis were more seriously feared than now. Notwithstanding Tuffier's brilliant and unique success with this method, which in 1894 permitted him not only to explore but to extirpate a tuberculous apex, the procedure is, as a rule, impracticable. The fear of shock and interference with the respiratory functions will also prevent the general adoption of Bazy's method of direct intrapleural exploration, which this surgeon also adopted with success in 1895.

Bazy makes an incision in the intercostal spaces just large enough to admit the index-finger into the pleura. H. Delagenière, with less regard for the risk of pneumothorax, would open the pleura freely for exploratory purposes, depending upon his ability to seize the retreating lung promptly and suturing it to the wound to prevent complete atelectasis. Poirier, Lejars, Ricard, Monod, and others have adopted Bazy's procedure with variable results. The advantages of a free and direct intrapleural exploration of the lungs to localize lesions, adhesions, and to determine other points, are obvious enough; but such a procedure, no matter how carefully and aseptically conducted, is fraught with risk, and will never appear to the general surgeon in the same innocent light that he now regards exploratory laparotomy. *Until the risk of seriously interfering with respiratory function by inducing acute collapse of the lung is clearly eliminated, or is reduced to a safe minimum, the analogy between the pleura*

and the peritoncum from the surgical point of view will never exist.

What is the true nature of the process, or the mechanism, as it were, by which this sudden collapse of the lung gives rise, at times, to such disastrous phenomena as those here recorded? Again, why is it that the sudden free opening of the pleura with complete collapse of the lung will be followed by only a slightly accelerated breathing, perhaps a little more rapid pulse; and, in others, in apparently identical circumstances, the patients will suffocate, gasp, and often die with the first rush of air into the pleura? These questions remind us of the difficulty we experience in explaining other obscure manifestations of the pleura, notably the peculiar susceptibility or idiosyncrasy, as we might term the tendency (for want of better name), that some persons manifest to pleural irritation. In many cases of empyema (the vast majority, no doubt) antiseptic irrigation can be applied without bad effects; in others, the injection of the mildest and most innocent solutions, even air (Quenu), is followed by shock and terrible circulatory and respiratory disturbances, convulsions (*pleural epilepsy*, de Cereville), and even death. And these are not mere accidents and irregular manifestations, but the invariable result of the application of the irritant to the pleural surface of this particular class of patients. It is the fear of these untoward effects, joined to the conviction that antiseptic irrigation of the pleura is unreliable as a means of sterilization, that has caused the antiseptic washing of the pleura in empyema to become an obsolete practice in all but putrid cases. These differences are no doubt intimately associated with the variable susceptibility to shock in general that is displayed by different individuals; some, for instance, who are trained to stand "punishment" can be battered about the chest with impunity, others sink in syncope, or in that peculiar state of thoracic shock with shallow breathing which Riedinger has so graphically described under the name of *commotio thoracica*, as the result of a mere

fall on the chest. We know that *age* is an important factor in the production of the bad symptom of surgical pneumothorax, and young children are especially susceptible to its disastrous effects. This is no doubt due to the fact that the mediastinal partition that separates the two lungs is very thin, movable, and compressible. In this way, not only is one lung completely collapsed, but the progressive aspiration of air into the chest through the wound, with the respiratory efforts, ultimately compresses the lung on the uninjured side. The existence of unrecognized adhesions (these occur, according to Panas, in 25 per cent. of all adults, Delorme, "Chirurgie de Guerre," Vol. ii, 1893) and of lesions in the lung itself (chronic tubercular, pneumonic, fibroid or neoplastic infiltrations, abscess, cavities, etc.), which prevent its collapse, no doubt account for the remarkable freedom from bad symptoms in many cases. Yet there are a few inexplicable cases in which bad respiratory symptoms have followed the opening of the chest when it was evident at the time that adhesions existed and that the collapse of the lung was only partial. (Zerubin Ivan, Bardeleben, Tietze, quoted by Quenu and Longuet.) The *size* of the opening and the rapidity with which the air penetrates in the pleura, and the *suddenness* with which the collapse of the lung takes place, are undoubtedly most important factors in determining the gravity and urgency of the symptoms. On these points the evidence furnished by clinical and experimental observation is concurrent and unanimous. The *situation* of the wound has no doubt a decided influence in modifying the symptoms of pneumothorax; though here the testimony of observers is at times contradictory. In a case of nephrectomy reported by Thiriar, of Brussels, several years ago, death took place suddenly on the operating-table, and before any assistance could be rendered, from an accidental tear in the lower pleural *cul-de-sac*, followed by immediate collapse of the lung. On the other hand, the numerous cases of stab-wound of the diaphragm in which the pleura

is opened in the lower costo-diaphragmatic *cul-de-sac*, especially those reported by the Italian surgeons, would lead one to believe that even extensive perforations in this region are not so liable to the bad effects of pneumothorax owing to the close apposition of the diaphragm, which acts as an obturator and prevents a sudden filling of the pleura with air.

The true explanation of the comparative benignity of the pneumothorax in the numerous successful operations (by making large fenestra in the chest), reported by Postemski and his colleagues, lies in the fact that in stab-wounds of the diaphragm a partial or incomplete pneumothorax is caused by injury itself, which prepares the lung, as it were, for the complete collapse of the lung which occurs when the larger opening is made subsequently, to repair the diaphragmatic injury. There are, nevertheless, a few exceptional cases on record in which large openings have been made in the chest wall for the removal of rib tumors, in which the collapse of the lung has been complete, without the occurrence of very serious or alarming respiratory symptoms (*e.g.*, Vautrin's case). It is very difficult to account for such remarkably good behavior on the part of the patient, and we must explain these differences (for want of better theory) on the ground of a native capacity for resistance to shock and traumatic conditions. Of one thing we are certain, and that is, that the mere suppression of the entire aërating surface of one lung by complete atelectasis is not incompatible with life or with a satisfactory respiratory capacity. Any surgeon of experience who will recall the condition of the lung, as it lies compressed and completely obliterated in a mass of exudate, in cases of chronic empyema, will need no further demonstration to convince him of the truth of these propositions. No experimentation on animals is required to prove a point so clear to all. Furthermore, the sufficiency of one lung for purposes of respiration, apart from other pathological and experimental evidences, is in harmony with the general law of adaptation and compensation so beautifully illustrated by

all the dual and symmetrical organs of the body (kidneys, testes, etc.), to call for much question. And yet it is undeniable that the dangers of acute pneumothorax are due essentially to the sudden suppression of the respiratory function,—i.e., to asphyxia. There are cases, exceptionally it is true, in which death occurs almost instantly with the first tear in the pleura,—too quickly, in fact, to be due to a simple arrest in the respiration. Such cases remind us of the rare deaths in chloroform and ether narcosis, in which the anæsthetic has scarcely had time to reach the larynx when death takes place. These fatalities are so instantaneous that they can be accounted for in no other way than by some form of reflex inhibition of the cardio-respiratory apparatus in the medulla through the agency of irritant centripetal impulses starting in the peripheral nerves. In the majority of cases the fatal termination comes on more gradually, in a few minutes or even hours, which is evidence that the asphyxia is purely mechanical and is due to insufficient oxygenation. In pathological conditions (hydrothorax, empyema, pneumothorax), the element of respiratory shock is eliminated by the *gradual* encroachments of disease, and an opportunity is given to the respiratory centres, and remaining pulmonary surface of the sound lung, to accommodate themselves to the new conditions. This difference between the *gradual* suppression of lung function and its *sudden* total extinction on the other is what makes pathological pneumothorax relatively benign, and acute traumatic or “surgeon’s” pneumothorax so dangerous. This difference seems to depend on the fact that in the acute total collapse of the lung that is brought about by creating a large aperture in the pleura, not only is the lung on the affected side functionally disabled, but the *opposite* lung, on the uninjured side, is *also* effectually crippled so that it is rendered valueless as far as its oxygenating capacity is concerned. In other words, it would appear that the sudden suppression of one lung would also inhibit the functions of the other, so as to totally arrest the respiratory capacity of *both* organs. If one lung were to maintain its respiratory

capacity while the other was collapsed, it is not likely that asphyxia would take place, as the aërating function of one lung is quite sufficient to meet the demands of the organism.

That the sudden "brusque" collapse of one lung will lead to a synchronous arrest of the entire respiratory mechanism is a fact that would appear to be sustained by the experimental study of this phenomenon by the graphic method. Carlet and Strauss (1873), and Gilbert and Roger (1891), studied and first applied the graphic method to the experimental study of pneumothorax, but the most instructive observations are those published by Rodet and Pourrat ("Récherches expérimentales sur le Pneumothorax," 1892) and in J. Pourrat's thesis ("Contribution à l'Etude du Pneumothorax expérimentale par Plaies pénétrante de Poitrine," Lyons, 1892).

In these experiments complete tracings of the respiratory movements were obtained by using an intratracheal canula connected by a bar to a recording tambour on the plan of a Marey's pneumograph. The results obtained when collapse of the lung was produced by making a large fenestrum in the pleura were always the same:

"Immediately upon opening the pleura, the lips of the wound in the chest being kept forcibly open, the respiratory movements increased at first in amplitude; then, after a short phase of acceleration, they become slower, . . . producing by an elongation of the pauses and a diminution in the amplitude of the inspirations the final and complete arrest of the thoracic movements and absolute cessation of respiration." If the external wound was closed and artificial respiration was practised either by external methods or by direct intratracheal insufflation, the breathing could be restored and the animal brought back to life; but in two anæsthetized dogs artificial respiration was ineffectual after the first cessation of breathing had occurred. On the other hand, if the external wound was closed promptly, before the thoracic movements had completely stopped, the animal usually recovered.

In concluding their observations, Rodet and Pourrat ask themselves, What is the cause of these respiratory troubles? Asphyxia certainly plays an important part in the second phase of these manifestations, but it does not suffice to explain the beginning. Must we account for the symptoms by an inhibition of the respiratory centres caused by the impression produced on the sensory nerves of the pleura by the abnormal ventilation of the serosa? Perhaps this may be the case, but we are inclined to see the explanation in another light. The collapsed lung does not expand, as we have seen; this inertia completely suppresses the normal stimulation which the peripheral sensory fibres receive from the constant movement of air in the lungs, and which is perhaps necessary to the respiratory reflex. The change that takes place in the play of the thorax after section of the vagi is not without analogy to the changes that are observed in open pneumothorax, and we are tempted to see, in both conditions, the same explanation,—viz., the suppression of the centripetal impressions that are transmitted from the lungs to the medulla, only that in one case (section of vagi) this suppression of the respiratory movements is brought about by anæsthesia of the lung, and in the other (pneumothorax) by their immobilization and compression.

Several other theories have been advanced to explain the mechanism by which acute traumatic pneumothorax may lead to asphyxia, but Rodet and Pourrat's explanation appears to us as satisfactory, if not more so than other theories that have been suggested with less experimental or clinical evidence to support them. Another interesting point brought out by the researches of these observers in their studies is that the dangers of acute *open* pneumothorax are very much diminished by the repeated injection of small quantities of air into the pleura. By thus producing a partial and incomplete pneumothorax, the lung and nervous centres are gradually prepared for the complete pneumothorax that is to follow. They determined that if air is

forced into the pleura through a canula, in small quantities and at short intervals, relatively large injections of air are well borne. One hundred cubic centimetres in little dogs; 200–250 cubic centimetres in animals of medium size; and 350 to 400 cubic centimetres in large dogs could be repeated without serious disturbance. If a larger quantity of air (always sterile) is injected, a marked respiratory oppression is produced, with a momentary weakening in the præcordial impulse.¹

Lawson, independently imbued with these ideas, prepared his patient for the extirpation of a tuberculous apex by injecting sterilized air into the pleura as a preliminary to pneumectomy, thus preparing the lung and pleura for the free admission of air that followed the opening of the pleura, without evil effects, shortly after. In this way a *gradual* pneumothorax was substituted for an *acute* one. Witzel, the same year (*Centralblatt für Chirurgie*, No. 24, 1890), and with

¹ Since this was written, Dr. Murphy has advanced a mechanical explanation for the asphyxia of pneumothorax, which has the merit of being original and ingenious, if not altogether convincing. Dr. Murphy believes that "dyspnœa following opening of the pleural cavity is due to the vibration of the mediastinal septum and contents destroying the piston action of the diaphragm." After collapse of the lung had taken place, he observed, while experimenting on a dog, that "the mediastinal septum and contents flopped to and fro in respiration like a sail during a lull; when the dog inhaled, the mediastinal septum concaved greatly to the uninjured side; when he exhaled it convexed to the opposite side. The chest ceased to be a cylinder for the piston,—the diaphragm, in the respiratory act." . . . He found that by placing a forceps on the hilum of the collapsed lung and thus immobilizing the septum, he was able to relieve the dyspnœa. It appears to us that, notwithstanding its debatable phases, this theory is, to say the least, very practical, and should be kept in mind for working purposes at the bedside and in the operating-room.

In connection with Dr. Murphy's experiments in the production of artificial pneumothorax with nitrogen, it is curious to observe that Pourrat, in his thesis (1892), states that the sterilized air injected into the pleural cavity is absorbed in forty days at furthest, and that on analysis it was found that oxygen disappeared much earlier than the nitrogen of the atmosphere. Rodet and Pourrat are also very careful in their description of the technic of the injection of air into the pleura, and describe a blunt canula with a lateral opening by which the pleural injections are very much simplified in their application. In this experimental work they certainly had anticipated some of Dr. Murphy's researches.

the view of preventing the bad effects of sudden collapse of the lung in resecting the chest wall, injected sterilized water in sufficient quantity to fill up the pleura, substituting in this way a gradual hydrothorax for an acute pneumothorax.

The methods which have been tried successfully to counteract the disastrous effects of acute pneumothorax in the course of operations on the chest are the result rather of instinct and empirical experience than of a clear understanding of the physiological conditions that are at fault. The dominant idea, thus far, has been to act in such a way as to prevent further encroachment upon the crippled function of the lung by the external air rather than to *restore* the respiratory function by inflating the collapsed lung directly. From the days of Richerand, and long before him, in penetrating wounds of the chest, the first step taken by the operator was to immediately seal the opening; a practice which both in the clinic and in the laboratory has been productive of some, though not always, complete relief. The sealing of the external opening prevents further entrance of air and acts by diminishing the intrathoracic tension, which would otherwise be intensified with every violent inspiration and paroxysm of cough. Sealing the external wound has been found to do good in all cases, but in many the relief experienced by this means is only partial,—as in Doyen's case, in which final relief to the dyspnoea was only obtained after the air contained in the pleura had been removed by aspiration. I could also quote one of my own experiences in which the patient was scarcely relieved. In other instances relief has been obtained by seizing the retreating lung and suturing it to the chest opening, which is sealed by it (Péan, Roux, Bayer *et als*). Under these circumstances the relief is doubtless obtained in two ways: first, by preventing the complete retreat of the lung upon its hilum; and, secondly, preventing further admission of air by plugging the opening in the pleura with the lung itself.

A great deal of time could be profitably invested in the

consideration of this and other allied problems presented by the surgical pathology of the chest, but sufficient has been said to enable me to formulate the following practical and almost axiomatic conclusions:

(1) That whatever the essential causes of the phenomena of acute traumatic pneumothorax, they are always associated with the sudden, free, large opening of the pleura and immediate collapse of the lung.

(2) That while these phenomena vary in intensity according to individuals and circumstances, and in some cases are so slight that they can be disregarded, it is the duty of every surgeon, whenever he is about to undertake an operation on the chest or neighboring region which might involve the pleura, to assume that pneumothorax is inevitable, and that he must be prepared to meet the evil effects of acute atelectasis.

It is evident that the most certain way of preventing the evil effects of atmospheric distention of the pleural cavity would be to obliterate it, at least in patches, so as to fasten the lung to the parietal pleura by adhesions, and thus prevent the retraction of the organ upon its hilum, when the pleura is opened. This is Nature's method, not only of preventing pneumothorax from pathological perforation of the bronchi, but also of circumscribing the influence of septic agencies from within. This suggestion, taken from nature, furnishes the key to the numerous experiments and methods for provoking adhesion by which the surgeons of the present period have endeavored to guard the entrance of the knife into the chest. The names of Quincke, Godlee, Bardeleben, De Cereville, Israel, Laache, Vautrin, Delagenière, Roux, Walter, Quenu, and Longuet are sufficient and prominent enough to prove that the efforts made in this direction have been numerous and determined.

The methods thus far adopted may be classified (Quenu and Longuet, contribution of December, 1896) into: (1) methods that provoke adhesions by the application of irri-

tants and caustics to the chest wall and pleura. This is simply a revival of Recamier's old plan of securing peritoneal adhesions over the liver, which we owe to Krimmer and Waller (1830), and latterly to Quincke, who has resorted to it with the same object, in the chest; (2) adhesions obtained by acupuncture, or by trocars allowed to remain *in situ* (Godlee, Bardeleben); (3) adhesions obtained by suturing the pleural surfaces as a preliminary to operations (Péan, De Cervenille, Roux, Quenu, Laache, Godlee, suggested by Poulet, 1851), or, secondarily, after the pleura has been opened in order to anchor the lung to the chest wall (Dela-genière *et als*). The secondary suturing of the cyst wall in operations upon cysts, hydatids of the lungs, etc., might also be referred to in this group (Israel, Poirier, Segond, Man-noury, Quenu, etc.).

Quenu and Longuet repeated in sixty experiments all the methods recommended by previous observers, adding a good many original procedures of their own, such as the introduction of aseptic foreign bodies in the pleura, ignipuncture with the thermo-cautery, electrolysis, harpooning and transfixing the pleura and lung subcutaneously. As a result of their numerous investigations, they came to the conclusion that it was impossible to obtain anything like firm or extensive adhesions without a certain amount of infection. That pleural adhesions, and in fact all inflammatory adhesions in serous membranes, are the result of some form of infection, no matter how much this may be attenuated. They believe that suturing the pleural surfaces, no matter how closely, or how much thread is used, will not cause the least exudation unless there is a certain degree of infection, which, in their carefully conducted experiments, averaged once in twelve cases. The success in securing adhesions which has been obtained by surgeons, the world over, must therefore be due, if Quenu and Longuet are right, to a moderate amount of sepsis; an occurrence which is not surprising, as in the majority of cases in which efforts to obtain adhesions

are most often made septic conditions exist, and contamination, in some form, takes place.

Notwithstanding their failure to obtain adhesions unless there was some infection of the threads, these investigators recommend a mode of pulmonary suture which they describe as "costopneumopexy," which is intended as a preliminary or first stage to pleurotomy. By this method the lung is anchored to the ribs by passing a threaded needle (curved) through the interspaces close to the ribs, after all the tissues have been divided down to the intercostal muscles. The intercostal muscles, with a layer of lung tissue, are included with the parietal and visceral pleuræ in the grasp of the sutures, the ends of the thread being tied or twisted, temporarily if wire is used, over the ribs. The advantages claimed for this procedure are that the sutures will hold very firmly by the intercostal muscles, which will not tear or leak as when the pleura alone is sutured. In cases in which there is no time to wait for adhesions to form, and it is desirable to circumscribe the pleura before opening a focus of infection, this method, or Roux's continuous back-stitch (*arrière-point*), should be resorted to.

The advantages of adhesions are so obvious in pulmonary surgery that this point need not be further discussed. However, we have now come to a time when new expedients are being devised for preventing pulmonary collapse and for maintaining the functional activity of the lung after opening the pleura. It is these new expedients which promise most hopefully to revolutionize the surgery of the thorax in a manner that will relegate adhesions to a secondary and humbler plane.

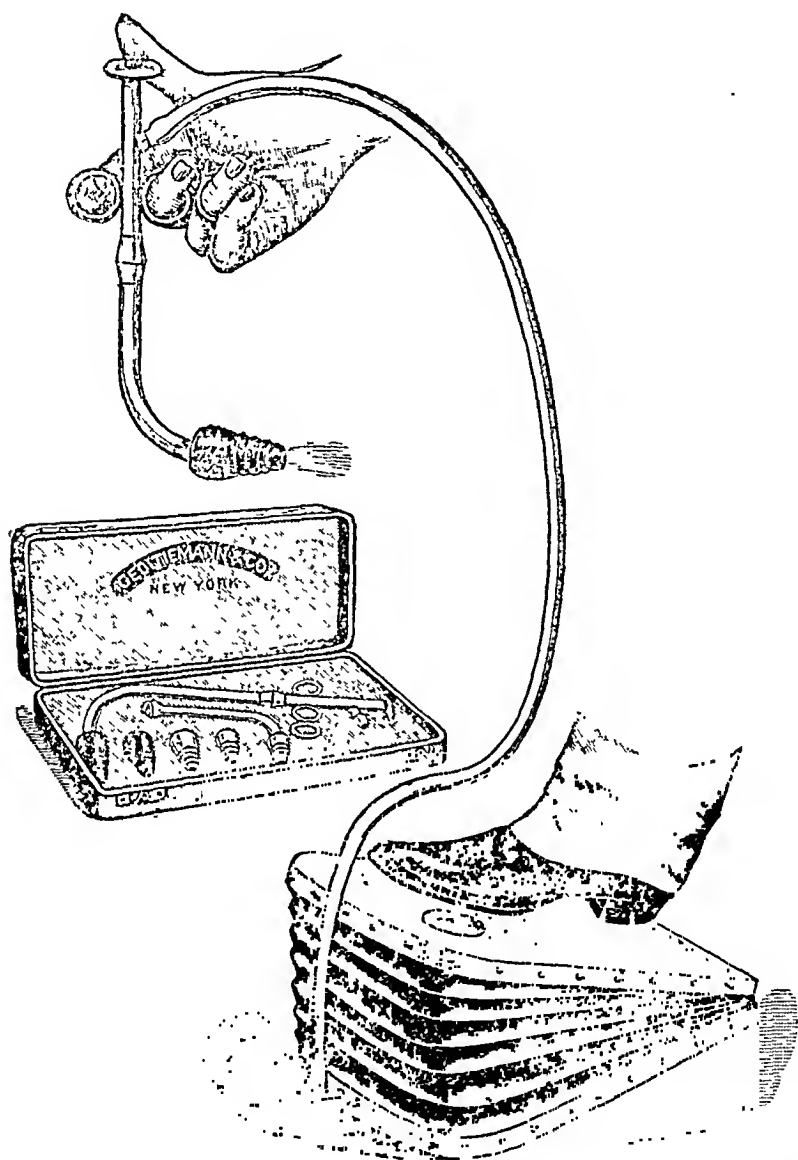
The procedure that promises the most benefit in preventing pulmonary collapse in operations on the chest is the artificial inflation of the lung and the rhythmical maintenance of artificial respiration by a tube in the glottis directly connected with a bellows. Like other discoveries, it is not only elementary in its simplicity, but the fundamental ideas

involved in this important suggestion have been lying idle before the eyes of the profession for years. It is curious that surgeons should have failed to apply for so long a time the suggestions of the physiological laboratory, where the bellows and tracheal tubes have been in constant use from the days of Magendie to the present. in practising artificial respiration on animals.

It took the practical sense of a zealous, energetic American physician, Dr. George E. Fell, of Buffalo, New York, to transfer the experience of the laboratory to that of the bedside. In 1893, he described at the Pan-American Congress (held in Washington, September 7, 1893) an apparatus that he had successfully employed for maintaining artificial respiration in cases of opium-poisoning. His method is identical with that employed in laboratories to carry on respiration in animals by forcing air into the lungs through a canula inserted in the trachea, or by means of a mask applied over the mouth and nose. The danger of tracheotomy and the inefficacy of the mask, which were pointed out in the discussion that followed in Washington, were soon overcome by another American of inventive genius, Dr. O'Dwyer. The name of O'Dwyer will at once account for the radical transformation of Fell's apparatus in one essential,—namely, the substitution of an intubation tube for a tracheotomy canula.

O'Dwyer's resurrection of Bouchut's crude ideas on intubation, and his magical transformation of the bloody and tragic picture of tracheotomy in diphtheria into a simple, painless, and bloodless bit of technical jugglery by his perfected method of intubation, has practically closed for all time one of the most conspicuous chapters in the history of surgery. By similarly transforming the tracheotomy canula of the Fell apparatus to an intubation tube he unconsciously but fittingly opened to surgery a new chapter of greater interest and promise than that which his previous achievement had brought to a close.

Dr. O'Dwyer says, in commenting on the Fell apparatus: "In the performance of artificial respiration by any



The Fell-O'Dwyer apparatus. This illustration shows an early model; since then the bellows has been improved by the addition of a strong wooden frame which holds it steadily, and is provided with a long arm that acts as a powerful foot-piece for compressing the machine, with the least amount of muscular effort.

means, it is important to remember that all we have to do is to get air into the lungs, and give it sufficient room and

time to escape; the power generated and stored up in overcoming the resistance to inspiration being amply sufficient to carry on expiration." Dr. O'Dwyer's substitute for the tracheal canula consisted in an intubation attachment with a laryngeal end curved on a right angle and tipped with a conical head, which is designed to be of the right size to wedge itself into the larynx and prevent air from returning between it and the laryngeal wall. The proximal end is practically bifurcated,—one branch receiving the ingoing air from the bellows and tube; the other branch, stopped with the operator's thumb (which is to act as a valve), serves for the exit of the air. The value of this apparatus has been made apparent to English-speaking readers by the exertions of Dr. W. P. Northrup, who, describing it appropriately as the Fell-O'Dwyer apparatus, has demonstrated its inestimable value as the simplest and most effective appliance known for maintaining artificial respiration. He has represented the merits of this apparatus and the results of its application before the British Medical Association (Bristol meeting, 1894); Association of American Physicians (Washington meeting, June, 1895), and in the medical and surgical reports of the Presbyterian Hospital of New York for January, 1896.

In this last contribution he presents the reports of eight cases, which conclusively demonstrate the value of the apparatus from the purely medical point of view. We notice the following statements among his conclusions: (1) That the Fell-O'Dwyer apparatus is an efficient aid in carrying on prolonged artificial and forcible respiration. (2) The procedure is not necessarily attended with any injury of the larynx or lungs of the patient; (3) it requires but one attendant at a time, and does not make unwarranted drafts upon the strength and endurance of such attendant; (4) the intubation tube can be inserted by the average physician without previous practice and to patients of all ages; the laryngeal end being easily adapted by its conical form to the dimension of any glottis. It is not only perfectly adapted to

the larynx, but seals this so completely that even when the stomach contents are being washed out the tube in the larynx need not be disturbed. It has been kept in constant operation in some cases (opium narcosis, cerebral traumatism) for twenty-four hours and longer (Northrup) without any injurious effect on the larynx, provided respiration is carried out at the rate of twelve to sixteen times a minute, allowing plenty of time for expiration in order to accumulate air in the lungs. The apparatus has been used thus far most extensively in the treatment of acute opium-poisoning, for which it is admirably adapted, and has already saved several lives in the practice of this Charity Hospital, where it was first introduced by the present house surgeon, Dr. J. D. Bloom. But, as already indicated, its range of application is as wide as the conditions in which respiratory failure from any cause is the dominant element of danger. As Dr. Northrup remarks, this apparatus commends itself as of great value in operations about the mouth, keeping blood from entering the larynx while providing an excellent normal respiration; also for cases of suspended respiration in ether and chloroform narcosis. An anæsthetic may be administered through an intubation-tube, or oxygen, if required, may be insufflated into the lung as a restorative agent.

We have demonstrated that the practice of artificial respiration by *intubation* of the larynx is an American invention, and that the excellence of the Fell-O'Dwyer apparatus as an appliance for the direct inflation of the lung, and for artificial respiration, had been fully established long before any foreign contrivances for the same purpose had been made. It is only just to note, however, that independent work has been done in this direction elsewhere and that the *application* of a similar apparatus for preventing the collapse of the lung in penetrating operations on the chest and its contents is a suggestion that has come to us independently from the other side of the Atlantic. In a discussion at the Société de Chirurgie in Paris (February 10, 1897), Delorme said that the need of an

appliance to inflate the lungs had occurred to him when he first performed his operation of decortication and liberation of the imprisoned lung in chronic empyema. But the surprising manner in which the lung expanded spontaneously and filled the pleural cavity after it had been released from its confining shell of exudates, in his first case and in another operated by Lardy (of Constantinople), showed him that the expansion of the lung could be effected without the help of such an appliance and by the efforts of nature alone. He believed that a sufficient increase in the intrabronchial pressure is obtained by the closure of the glottis in the paroxysms of cough that occur in the course of the operation. But that nature's unaided efforts are uncertain and cannot be trusted under such circumstances is proven by other operators who have adopted Delorme's procedure. Cases of this class, in which the lung is freed after a long period of inaction, and when ample opportunity has been given to the organism to accommodate itself to a crippled respiratory function, are not apposite to the class of cases under discussion, as in these the desideratum is a certain means of preventing *acute pneumothorax* in surgical operations. Delorme also mentions a Belgian surgeon, Mr. Lambotte, as having advised, some time before him, the artificial inflation of the lung in surgical conditions. But it is to Tuffier, Quenu, with their associates Hallion and Longuet, and to Doyen that we owe a debt of recognition for their scientific demonstration of the value of artificial inflation of the lung through the larynx for the prevention and relief of surgical pneumothorax. From what we can gather in the literature of this subject, it would appear that the same thought had occurred to these surgeons independently of each other and at about the same time, and that they worked at the solution of this problem contemporaneously by different methods and expedients, all of which, however, tended to the same result.

Tuffier and Hallion reported their first experiments to the Société de Biologie, November 21, 1896, and Tuffier

read a paper on the subject to the Société de Chirurgie in February, 1897. (*Bulletin et Mémoires de la Société de Chirurgie*, February and March, 1897.) They were prompted to undertake their inquiry by their appreciation of the necessity of actively maintaining the functions of the lung in intrathoracic operations. Their great merit is that they obtained this result by insufflating the lungs through an intralaryngeal tube; and they secured the necessary data by which to regulate the intrabronchial pressure with scientific accuracy, though it is evident that Fell and O'Dwyer had resolved these questions in the simplest manner by mere clinical observations on the living subject. Tuffier and Hallion determined that an intrabronchial pressure equal to thirty-three millimetres mercury arrested respiration and defeated the purpose of the insufflation. A pressure of six millimetres is all that is required to overcome the elasticity of the lung and equalize the air pressure. In addition to this, Tuffier and Hallion's experiments clearly demonstrate the great possibilities of pulmonary inflation in the future of intrathoracic surgery. The following experiment will best illustrate their conclusions: "A dog was chloroformed, and a long copper tube attached to a bellows was introduced into the larynx through the mouth. Artificial respiration being thus established, the pleura is incised freely, and the edges of the wound are kept wide apart to allow the air to enter freely. If the pleural cavity is then illuminated with an incandescent lamp, it is comparatively easy to perform operations on the œsophagus, sympathetic and pneumogastric, without interfering with the respiration. Several dogs treated in this way recovered and survived several months without suffering any serious disturbance after the operation, and it is upon this point that we would especially insist to-day."

Coincidentally with Tuffier and Hallion's experiments with intubation, Quenu and Longuet undertook an extensive series of researches, chiefly with the object of determining the best means of securing pleural adhesions. Real-

izing all the difficulties which attended this process whenever it was attempted after collapse of the lung had taken place, they independently began to experiment with insufflation of the lungs with a cylinder of compressed air connected to a canula tied to the trachea. They also tried a simpler plan of making the animal breathe an atmosphere of compressed air by enclosing the head in an apparatus somewhat like a diver's suit.

Notwithstanding all the disadvantages and imperfections of their methods, they convinced themselves of the enormous advantages of any procedure that will compel the lung to remain in contact with the chest wall. They also observed the facility and safety with which the lung can be explored; and, in addition, the tendency to spontaneous hæmostasis displayed by the lung when it becomes herniated in the parietal opening under these conditions. In conclusion, they state their conviction that it is in this direction that further efforts must be made if the surgery of the chest is to make further progress.

It remained for Doyen's quick and inventive mind to complete the researches of Tuffier and Quenu. Whether independently of these investigators or profiting through their experience (he does not say in any of his publications), he devised a set of intubation-tubes evidently suggested by O'Dwyer's models (which he does not mention, however), and connected these with a bellows of his own construction, and thus completed an apparatus which reflects the greatest credit upon his mechanical ability. This apparatus was first described in his "Technique Chirurgicale," pp. 129-33, and since then in a short article, "La Chirurgie du Poumon," *Revue de Thérapeutique medico-chirurgicale*, January 15, 1898, Vol. lxxv.

While Doyen's model is in several respects inferior for general use to the Fell-O'Dwyer apparatus, especially in the intubating part of the apparatus, it is nevertheless very ingenious in the construction of the bellows, which can be used

as an aspirator of gases in the pleura or for the purpose of administering anæsthetics or oxygen by intubation.¹

¹ Since this contribution has been written, my colleague, Dr. F. W. Parham, has brilliantly confirmed the opinion herein expressed as to the value of the Fell-O'Dwyer apparatus, by successfully removing a large sarcoma of the upper chest wall (involving the second, third, and fourth ribs). The complete excision of a large quadrilateral area of the chest, including section of ribs, was necessitated by the invasion of the neoplasm. The pleura was opened freely, but the collapse of the lung which would have inevitably followed, and the bad symptoms that were beginning to be noticed, were immediately corrected by the Fell-O'Dwyer apparatus. This kept the lung freely distended, and maintained a regular respiration until it had been sutured by continuous stitch to the parietal pleura and the wound had been closed completely by skin-flap. The patient was taken to his ward in excellent condition, showing no serious shock. Some suppuration in the wound occurred, but complete recovery has been confirmed and the patient is now about and well.

CHOLECYSTITIS.¹

A CLINICAL REVIEW OF TWENTY-ONE CASES.

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IN November, 1893 ("Gangrenous Cholecystitis," *ANNALS OF SURGERY*, February, 1894, pp. 197-205), I presented to this society the history of a case of gangrene of the gall-bladder, secondary to gall-stones, in a boy of nineteen. The symptoms in this case so closely resembled those of an acute perforative appendicitis that the real condition was not made out until the abdomen was opened. Since that time I have had an opportunity of seeing and operating upon a number of cases of cholelithiasis, and have been rather forced to the conclusion that while cases presenting the classical symptoms of biliary colic are recognized very generally by practitioners, those cases of cholecystitis in which colic is absent or not a prominent feature are often entirely overlooked or wrongly diagnosed. Thus, it not uncommonly happens that the diagnosis is first made by the surgeon. This, it seems to the writer, is due partly to a lack of knowledge of this frequent complication of cholelithiasis, and partly to the fact that the medical mind so closely associates jaundice with biliary obstruction that it fails often to recognize cases of inflamed gall-bladder due to an obstruction of the cystic duct in which jaundice is absent. Catarrhal inflammation of the gall-

¹ Read before the New York Surgical Society, December 14, 1898.

bladder and biliary ducts is so frequent a complication of gall-stones that, in cases of long standing at least, it may be regarded as practically an essential part of the disease. Gall-stones, as is well known, may remain in the gall-bladder for many years without their presence being suspected. On the other hand, they may cause obstruction of the ducts or lead to inflammation and ulceration of the gall-bladder or passages; or they may be the cause of angiocholitis, with hepatic or perihepatic abscess; or they may lead to perforation of the gall-bladder or ducts, and be the cause of an acute general peritonitis.

When a stone escapes from the gall-bladder, it is usually arrested, for a time at least, in the cystic duct. In cases of this sort, an attack of biliary colic, more or less severe and more or less prolonged, is the result; and the gall-bladder becomes distended with mucus and bile, and often forms a palpable tumor which may be painful on pressure. After a stone has engaged in the neck of the gall-bladder or the cystic duct, it may drop back into the gall-bladder again very soon, and all the symptoms may very promptly subside for an indefinite period; or the stone may pass through into the common bile-duct and there become impacted. In this event, an attack of biliary colic with obstructive jaundice is the logical sequence. The occlusion in the common duct, although at first complete, soon may lead to a dilatation of the channel above the point of impaction, and the calculus may float upward in the dilated portion of the duct, allowing the bile to pass at certain times, and at other times be tightly impacted at the narrow part and cause complete obstruction to the flow of bile. In these cases of incomplete or intermittent obstruction, the jaundice may be intermittent or remittent, as are the other symptoms. In cases of this sort the gall-bladder is not, as a rule, dilated, but is generally smaller than normal and not palpable.

The length of time required for a stone to pass through cystic and common ducts into the duodenum varies in different cases. It may pass so quickly and easily in some cases,

especially where the passages have been previously dilated, that no colic or obstructive jaundice is produced; or it may remain for months in the ducts and give rise to various complications.

It has been clearly proved that calculus obstruction of the bile-ducts not only leads to a dilatation of these channels, above the point of impaction of the stone, together with stagnation and alteration of their fluid contents, but that it also favors the entrance of micro-organisms from the neighboring intestine. The point of entrance of these germs is probably always through the duodenal end of the common bile-duct; and it is also probable that in most cases these germs pass directly into the gall-bladder rather than into the hepatic ducts. This is evidenced by the greater frequency of cholecystitis as compared with cholangitis, etc.

Netter ligated aseptically in dogs the common bile-duct close to its duodenal end, and was able to cultivate bacteria in the bile obtained from the duct above the point of ligation. He demonstrated the presence of the *bacillus coli commune* and the *staphylococcus pyogenes aureus* in these cases. Since that time these and other micro-organisms have been found in the gall-bladder by various observers. The *streptococcus pyogenes*, the *diplococcus pneumoniae*, and the *bacillus typhosus* have been repeatedly demonstrated in the fluid obtained from inflamed gall-bladders. Naunyn ("Klinik für Cholelithiasis") made exploratory punctures in five cases of distended and inflamed gall-bladders due to obstruction of the cystic duct by calculi. In none of these cases was normal bile found, and in but one was the fluid withdrawn distinctly bile stained. The fluid from the other punctures was lightly straw colored, and contained mucus, albumen, and a few blood-cells. Cultures were made in four of these cases. In one it was sterile, and in the three others large numbers of the *bacillus coli commune* were found. In all these cases the symptoms were mild save in one instance; but in each the distended gall-bladder formed an appreciable tumor reaching, at the height of the attack, as low as the umbilicus. Arménis,

however, has shown that it is possible for the contents of the gall-bladder to remain aseptic in cases of obliteration of the cystic duct, and that in this condition atrophy of the gall-bladder results. (Arménis, *Thèse de Paris*, 1896.)

If the obstruction of the cystic duct is soon overcome, the distention of the gall-bladder soon disappears, and few, if any, evidences of inflammatory changes in its walls would be observed.

Where there is an obstruction of the cystic duct, and infection of the gall-bladder occurs, an acute cholecystitis of varying intensity results. In cases of this sort, abdominal pain more or less severe, and more or less limited to the region of the gall-bladder, tenderness on pressure, irregular fever, sometimes high, and a tumor, which is generally tender, appearing in the region of the ninth and tenth right costal cartilages, constitute the principal symptoms. In the severe cases, there is often great prostration with marked abdominal pain, which may be general; exquisite tenderness which extends often over a wider area than in the cases described; marked muscular rigidity of the right rectus abdominis, especially of its upper portion, and often general right-sided rigidity of the abdominal muscles; high, irregular, and often a remittent fever, and sometimes persistent vomiting.

The lesions found in cholecystitis vary in the different cases. In the milder grades of inflammation, softening of the mucous membrane, with here and there a slight erosion or areas of slight infiltration and thickening of the walls of the gall-bladder, may be noted. The fluid contents in these cases may be bile more or less altered in color and consistency, or a clear mucoid fluid which does not resemble bile. In the severe septic cases, the walls and contents of the gall-bladder show marked changes. The walls are either thick from inflammatory infiltration, succulent and friable, or they may be thinned from the great distention of the gall-bladder, or they may in rare cases be actually gangrenous. The thin, tense walls of an inflamed gall-bladder, it should be noted,

are often friable and soft, and punctures made intentionally, or otherwise do not, as a rule, spontaneously close.

The mucous lining of the gall-bladder in these septic cases is frequently ulcerated, and this ulceration may extend through the entire thickness of the wall and lead to perforation into the peritoneal cavity, or into an adherent intestine. The contents of the gall-bladder in these cases may be purulent, and the pus may be thick or thin and in large or small amount, or it may be muco-purulent with large clots of mucus and altered bile. The various lesions observed in the various cases of acute cholecystitis, secondary to a calculous obstruction of the cystic duct, depend of course upon different factors: as the size and character of the stone, the time which the obstruction has lasted, and upon the character and intensity of the infection and the degree of resistance of the tissues. For example, a gall-bladder which has long been the seat of chronic inflammation, which has led to thickening of its walls and changes in its mucous membrane, may be less able to cope with infection than a previously normal gall-bladder.

Following an attack of acute cholecystitis, the gall-bladder may be restored practically to its previous condition; or it may become the seat of a chronic inflammatory process which may lead to great thickening of its walls, with more or less contraction of its cavity; or it may become moderately or greatly distended with fluid and its walls become somewhat thinned. In some cases, a chronic ulceration of the mucous membrane may lead to adhesions between the gall-bladder and the adjoining intestine or abdominal wall, and to the formation of an internal or external biliary fistula; or in other cases to localized peritoneal abscesses; or the gall-bladder may become thickened, atrophied, buried in dense adhesions, and practically obliterated.

Ortner ("Zur Klinik der Cholelithiasis," 1894) classifies cases of gall-stone into two varieties,—the aseptic and the septic. In the former class he includes those cases which are not associated with septic complications, and in the latter all

those in which septic processes begin either in the gall-passages or affect them secondarily. Two conditions, therefore, may arise, as the result of the arrest of a calculus,—either a catarrhal inflammation of the gall-bladder and ducts which has fairly well-defined symptoms, or a biliary obstruction which is associated with the development of suppuration in the gall-bladder and biliary ducts. In some cases of acute cholecystitis an enlargement and tenderness of the liver may be made out; but it is much more common to feel a localized swelling below the edge of the ninth and tenth costal cartilages of the right side. This swelling extends downward and forward towards the umbilicus, or along a line drawn from the point of the ninth right costal cartilage to a point one-third of the distance between the pubic spine and the anterior superior spine of the ilium of the same side. The swelling is smooth, rounded, larger below than above, moves up and down with respiration, and can often be grasped and moved laterally. It is dull on percussion, often tender, and sometimes exquisitely so. This tumor can generally be made out by firm pressure with the finger-tips, the patient lying upon the back with the thighs flexed. It sometimes happens, however, that the tumor can be better appreciated by palpating the region of the gall-bladder with the patient sitting up and bending slightly forward.

In some cases the gall-bladder cannot be felt, although it may be found distinctly enlarged when the belly is opened.

Fürbringer (*Deutsche medicinische Wochenschrift*, April 10, 1891), in a study of sixty-four cases of cholelithiasis, of which thirteen were males and fifty-one females, states that he was generally able to detect a swelling of the liver, and often a tumor in the region of the gall-bladder.

Lateral compression of the lower ribs will often cause pain in cases of impacted stone in the cystic or common duct where the local tenderness over the region of the gall-bladder is not especially marked, or where no tumor is palpable. The writer has obtained confirmatory evidence of the value of this

method of diagnosis in a number of cases subsequently submitted to operation.

Waring ("Diseases of the Liver and Gall-Bladder," etc., London, 1897) proposes to divide all cases of cholelithiasis into two groups, according to the presence or absence of biliary colic. This division he makes purely for clinical purposes, and it seems a valuable one. In the first group he includes all cases in which attacks of biliary colic are a marked feature. In some of these cases, of course, the stones are all eventually passed, and the patient, after several attacks of colic, recovers entirely. In other cases, the stones cause more or less inflammation of the gall-bladder, which may persist for a variable time after the stones have passed into the duodenum, and which may lead to the formation of adhesions between the gall-bladder and the abdominal wall or adjacent viscera, and result in the persistence of the symptoms to a modified degree, even after all the stones have been passed. In the second group he includes a variety of cases in which biliary colic is not a leading symptom, and which comprises a number of allied pathological conditions. These are briefly:

(1) Cases in which impaction of the stone occurs in some part of its journey from the gall-bladder to the duodenum. The nature of the impaction may be such as to cause a partial or complete obstruction. When the cystic duct becomes completely obstructed, the gall-bladder becomes distended, and sometimes enormously so. Waring mentions a specimen of enormously distended gall-bladder in the museum of St. Bartholomew's Hospital, London, the lower extremity of which had passed through the right femoral ring and formed the contents of a sac of a right femoral hernia, and which was first discovered at the operation.

(2) Cases in which the impaction occurs in some part of the bile-ducts and is followed by the development of an infective, suppurative inflammation of their mucous lining. As a result, various conditions may be induced: Inflammation of the gall-bladder and ducts, empyema of the gall-bladder,

hepatic abscess, perihepatic abscess, acute general suppurative peritonitis, or perforation of the gall-bladder, or less commonly the ducts, with extrusion of their contents into the peritoneal cavity. These cases form the septic group, and are due generally to an ulceration of the mucous membrane, which becomes the seat of septic infection as a result of the invasion of pyogenic germs from the intestine. When the inflammatory process is limited to the ducts, as may rarely happen, an angiocholitis results, which may extend and cause an abscess of the liver; or the inflammation passing through the walls of the ducts may cause either a localized abscess in the neighborhood or a general peritonitis. When the stone becomes impacted in the cystic duct and infection takes place, the gall-bladder may become distended with pus, or the infective process may lead to ulceration in the neighborhood of the impacted stone, which results in perforation and peritonitis. These septic cases are characterized by high and irregular temperatures and evidences of profound constitutional depression.

(3) Cases in which adhesions are formed between the inflamed gall-bladder and the anterior abdominal wall, and are followed by abscess and the formation of an external biliary fistula.

(4) Cases in which adhesion to some neighboring viscus is followed by the formation of an internal biliary fistula.

(5) Cases in which intestinal obstruction occurs from impaction of a gall-stone in some portion of the intestinal tract.

(6) Cases in which an empyema of the gall-bladder is followed by a desiccation of the pus and the conversion of the gall-bladder into a mass of fibrous tissue or into a calcareous nodule.

(7) Cases in which a stricture of one of the ducts occurs as a result of ulceration from an impacted calculus.

(8) Cases in which the continued irritation of the mucous membrane of the gall-bladder or some portion of the

biliary ducts is succeeded by the development of carcinoma of one or other of these structures.

From a study of the symptomatology of inflamed gall-bladder and its various complications, it will be seen that the diagnosis in some cases is easy, and in others difficult. The differential diagnosis between an acute cholecystitis, an intestinal or gastric colic or an intercostal neuralgia, is generally not very difficult. Sometimes an inflamed movable right kidney may be mistaken for an inflamed gall-bladder. The diagnosis is not always easy in these cases, but may often be made if attention be paid to certain points in the history and in the examination.

The writer has been impressed by the frequency with which the diagnosis of appendicitis is made by physicians in cases presenting well-marked signs and symptoms of acute inflammation of the gall-bladder. In some cases, of course, as where peritonitis from extension or perforation of the gall-bladder has occurred, a differential diagnosis between the two conditions is often impossible.

The former practice of employing exploratory puncture in cases of suspected inflammation and distention of the gall-bladder is now abandoned by all careful surgeons. A small incision into the abdominal cavity is much safer and gives much more definite information.

As to the treatment of cholecystitis, a consensus of the best surgical opinion seems to generally favor operation. This statement may perhaps be modified somewhat, or at least be applicable to the following conditions. Operative interference is certainly indicated in all cases of empyema of the gall-bladder, and should be urged in all cases where this condition is suspected. Moreover, in all cases of cholelithiasis which are accompanied by repeated attacks of biliary colic and by the appearance of a tender tumor below the cartilage of the ninth rib, at the site of the gall-bladder, operation is indicated; although it is frequently refused until repeated attacks have exhausted the patient, or until the

appearance of septic complications render it imperative or useless.

In the condition of chronically enlarged gall-bladder, hydrops felleæ, an operation is advisable; and, finally, in all cases where the symptoms of acute peritonitis starting from the region of the gall-bladder ensue, an early laparotomy frequently is the only recourse.

If we bear in mind the possibility of infection, acute and chronic, of adhesions, strictures, thickenings around ducts, intestinal obstruction, and, finally, carcinoma, as a result of cholelithiasis, the surgeon should certainly feel justified in recommending and often in urging early operative interference in all cases which do not readily yield to milder means.

From the records of two hospitals with which the writer is connected, he has been able to collect the histories of nineteen cases of cholelithiasis which have been admitted during the years 1897 and 1898.

These cases, together with the one of gangrene of the gall-bladder already reported in 1893, and one of empyema of the gall-bladder operated upon in private practice in April, 1898, constitute a group of twenty-one cases, which are presented for your consideration.

Instead of reporting these cases in detail, it has seemed to me to be more profitable to study them in groups with especial reference to the symptomatology, diagnosis, and the pathological findings. Of the twenty-one cases, ten were males, eleven females. Of the females two were single, the others married. Most of the married women had borne children. Twelve cases were operated upon, in nine no operation was performed. Of the twelve operative cases, eight were in the practice of the writer and four in the practice of his colleagues. Of my own operative cases, four were cases of empyema of the gall-bladder, one case of gangrene of the gall-bladder, and the remaining three were cases of catarrhal cholecystitis from cystic duct obstruction. Of the remaining four cases operated upon by my colleagues, three were cases

of catarrhal inflammation of the gall-bladder, and the fourth was one of calculous obstruction of the common bile-duct, with atrophic gall-bladder. Of the twelve operative cases four died, one of septic peritonitis following choledochotomy and cholecystotomy, for an impacted stone in the common duct, in the service of a colleague, and three in the writer's own service. Of these three fatal cases two already had sepsis and general peritonitis before operation, and in the third, death occurred on the twenty-second day from a complicating pneumonia, the cholecystotomy wound having in the mean time nearly healed.

Of the non-operative cases one death occurred in an old woman, probably from general peritonitis, operation being declined, and the patient's condition being too poor for it to be urged.

Gall-stones were found in the bladder in eight cases and were not found in four. In the latter cases, however, evidences of cholecystitis were more or less marked, the gall-bladder being distended with mucus more or less bile stained, and containing clots of mucus which obstructed the neck. In all the cases except two the site of the obstruction was found to be in the neck of the gall-bladder or in the cystic duct. In the remaining two the stone was in the common duct in one tightly impacted, in the other passing into the intestine.

Two of the patients were observed in the first attack, in the others there was a history of several previous attacks of biliary colic. In the non-operative cases the symptoms of pain, etc., were more or less pronounced; but the course of the disease was generally mild, the fever moderate, and the tenderness soon disappearing. One case sent in to the medical wards as arsenical poisoning, on account of the pain and vomiting, was clearly a case of gall-stones, and recovered from the attack promptly.

Several cases were sent in as appendicitis, where a little more care in examination would have shown them to be typical cases of acute cholecystitis.

In all the cases under consideration, *fever* was present as a more or less marked symptom. In the milder cases it was always present, though often it was only very slight; and in the severe and suppurative cases, it was high and generally irregular. *Chills* were noted in the beginning of the attack and during the course of two cases. In the others this is not noted. In the greater number of cases there was a history of one or more attacks of biliary colic, and in all these cases nausea alone or nausea and vomiting were present at some time during the attack. In three of the cases belonging to this group there was no nausea or vomiting, and in ten it formed a well-marked symptom. This symptom of vomiting was especially pronounced in the case of impacted stone in the common duct. Emaciation in this case was also marked, and in one other, a case of empyema, it was present to a moderate degree. Jaundice was noted as being present in six cases and absent in five; in the other cases no note is made as to this, and in these it is fair to assume that it was absent in most of them. Constipation as an antecedent condition was found in most of the cases, and in several an attack of marked constipation preceded the appearance of the other symptoms. Diarrhœa was present in three cases. Typhoid fever immediately preceded an attack of cholecystitis in one case, and the relation of one to the other is at least suggestive, although no cultures were made from the contents of the gall-bladder.

Local tenderness was more or less marked in all the cases observed, and was regularly looked for in the upper portion of the right side of the abdomen opposite the end of the ninth rib. Deep pain on lateral compression was noted in many of the cases, and in some instances this procedure caused greater pain than pressure over the normal gall-bladder site. Muscular rigidity of the upper portion of the right rectus was noted in eight cases. In some cases this rigidity was not pronounced, but in others it was very marked, and in two or three instances it was associated with muscular rigidity of the whole right side of the abdomen and other signs of

an extensive peritonitis. Pain in the region of the gall-bladder and extending around to the back was noted in fourteen cases, and general abdominal pain was marked in two. A well-marked tumor was present and noted in nine cases, and was probably oftener present than noted in the history.

Dulness over an area corresponding to an enlarged gall-bladder was noted in three cases, and it is noted especially that no such dulness was evident in four cases. In one case a distended gall-bladder was found at operation which could not be made out before on account of the enlargement of the liver. Enlargement of the liver, as evidenced by an increased percussion area of dulness downward below the free borders of the ribs, was made out in three cases, and in the others it is not noted.

In three cases the attack for which they were admitted to the hospital followed pretty closely the ingestion of a heavy meal. In two cases there was a distinct history of a blow in the region of the gall-bladder, which was followed so closely by the appearance of pain in the region of the gall-bladder as to suggest to the patient at least some connection between them. One case gave the history of a severe wrench of the abdominal muscles during a fall, which was soon followed by the appearance of biliary symptoms.

In reviewing the conditions found at operation in these cases, it was noted that adhesions more or less extensive were found in five of my own cases and absent in two. Free fluid in the peritoneal cavity was found in three cases of acute cholecystitis. In one case of suppurative cholecystitis, the gall-bladder was closely adherent to the anterior abdominal wall, which was infiltrated also with pus, and formed externally a tumor which was red, fluctuating, and very tender on pressure. Three large stones were found in one of the cases, and in the others the calculi were either very small and very numerous, or they were moderate-sized and not so numerous. All the stones found were of the smooth faceted variety. The pus in one of the cases of empyema of the gall-bladder was thin and abundant with numerous stones; in

another it was thick and creamy; no stones were found, and there were evidences of cholangitis and general sepsis. In two of the cases the pus was mixed with mucus, and clear mucoid fluid and no stone was noted in another case—hydrophallæ.

In reviewing these cases, one is struck by the fact that in the majority of them the local and general symptoms corresponded fairly well to the severity of the case, and that in none of them, except as stated, were the local or general signs sufficiently obscure to make the diagnosis difficult. Yet we have seen that these cases were frequently sent in with a wrong diagnosis, which, with the exercise of a little care, would not have been made. May it not be that, in our endeavors to make an early diagnosis of appendicitis, we are sometimes prone to jump to the conclusion that all cases of right-sided abdominal pain which are attended with vomiting and tenderness may belong to that disease, and so fail to appreciate an acute cholecystitis which is often easy of recognition?

A MODIFICATION IN THE OPERATIVE METHOD FOR INVETERATE AND RELAPSED CASES OF TALIPES EQUINO- VARUS.¹

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THE management of talipes equino-varus tests the skill and practice of the surgeon as perhaps no other surgical disease. Thus far we have found no rapid-transit method that will enable us to discharge our subjects when the healing process after our radical operative procedure is complete. Immediate restoration is not so difficult, but to maintain the restored structures involves almost infinite care and watchfulness.

Passing in review the multitudinous methods proposed from time to time for the immediate correction of a deformity involving principally the medio-tarsal joint, one cannot refrain from wondering why the rapid-transit route has not yet been opened. A critical analysis of all corrective efforts soon demonstrates that certain fundamental principles underlie all the methods, whether mechanical or operative.

We have a deformity that essentially consists of a deviation inward and downward of that portion of the foot chiefly anterior to the medio-tarsal joint, causing the superincumbent weight to be borne upon the outer and often dorsal side of the foot. With a shortening of all of the soft structures on the concave side of the deformity, consisting of the skin,

¹ Read before the Western Association of Surgeons and Gynecologists at Omaha, Neb., December, 1898.

superficial and deep fascia, fibres of the internal fasciculus of the plantar fascia, the adductor hallucis muscle, internal plantar nerve and artery, the tendons of the tibialis posticus and anticus, internal lateral and calcaneo-scapoid ligaments. The soft structures on the outer or convex side of the deformity are elongated. The tarsal bones have become modified in accordance with their abnormal relations to each other.

The indications to be met consist in elongating the shortened soft structure, replacing misplaced bones, dividing and excising on the convex side of the deformity such hypertrophied and distorted osseous structures as interfere with complete replacement. Whether this is accomplished by force or by subcutaneous or open cutting operation, the tendency to recurrence must always be taken into account, therefore over-correction has become the rule; and yet this over-correction has not always been sufficient to prevent recurrence. All operative and mechanical methods require repeated sittings, extending over a considerable period of time, making it irksome to the patient; and he often passes from observation before the cure becomes complete. Surgeons have sought after a method by which correction could be made immediate in old inveterate deformities. Phelps, in 1881, made the most radical departure, by boldly cutting all the soft structures on the concave side of the deformity, forcing the foot into a valgus position. He made very little attempt at that time to secure healing under aseptic precautions, but allowed the large gaping wound to undergo repair by granulation under Peru balsam dressings. The granulating wound, one to two and even three inches in length by one to one and one-half inches wide, underwent ultimately considerable contraction, resulting in more or less relapse of the deformity.

An advance was made, when Schede acquainted us with his method of healing under a moist blood-clot in bone cavities. The Phelps operation done under strict aseptic precautions, the covering of the wound with silk protective retaining a blood-clot in it, insured a more rapid reparative

process and a less degree of recurrence. In order to still further prevent contraction, Mr. Arbuthnot Lane applied a large skin graft over the wound on the second day after operation. T. H. Kellock used "a flap of the whole thickness of the skin about an inch wide which is cut on the outer side of the foot by two parallel incisions reaching from the upper end of the operation wound to the sole, and dissected off the underlying structures, the skin being brought together underneath it by sutures. Five or six days later, the flap appearing to be well nourished, the lower end is divided and, leaving the upper end still attached, is turned across and secured by one or two horse-hair stitches into the deep wound on the inner side of the foot, which is by this time mostly covered with granulation tissue, and the foot and leg fixed in plaster of Paris." Muirhead Little carried out the same plan independently. Dr. William Gardner, of Melbourne, inserted a wedge of decalcified bone between the astragalus and scaphoid to fill the space produced after correction of the varus in Phelps's operation.

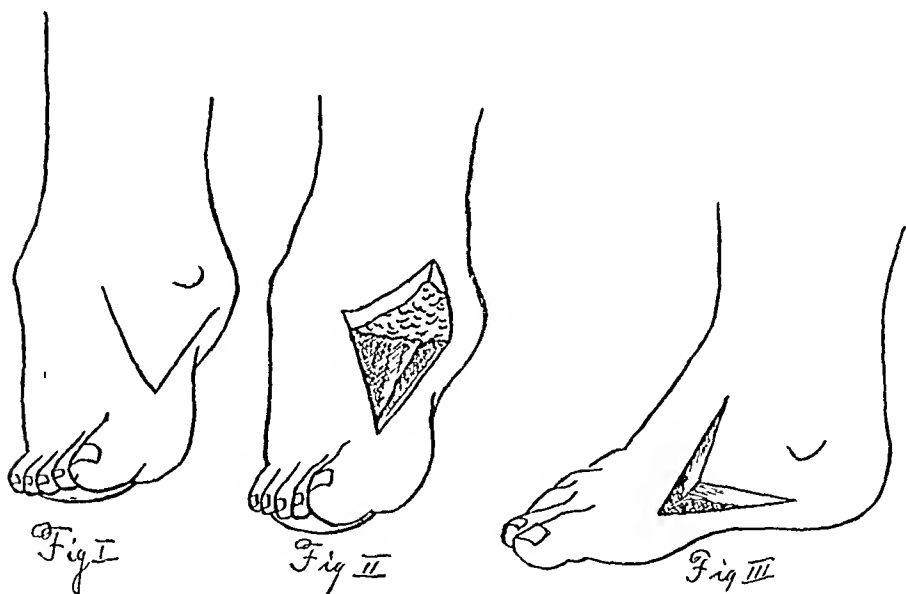
Various other modifications have been suggested to fill the large wound of the soft parts, and the space produced by the separation of the bones in the astragalo-scaphoid articulation.

To-day we wish to point out still another modification, which we hope will prove useful in directing us along a rapid route for the successful and immediate correction of inveterate varus deformities. The various skin-flap operations, both pedunculated and free, have always possessed the drawback of the liability to necrosis from inefficient blood-supply, and yet integument seems the only tissue that can fill the large gap in Phelps's procedure. It seems that if an attached flap with a broad pedicle can be produced, that under all circumstances will contain a sufficient blood-supply to insure its life, at the same time cover the greater part of the wound, more particularly the deeper part of the wound produced by the severed fascia, tendons, muscle, and ligaments, we shall

have made an advance in the direction of preventing recurrence caused by contraction of the soft parts.

It is now proposed to make a triangular flap, similar to that used in relieving Dupuytren's contraction of the fingers, a V-shaped incision as advocated by Busch, and by others for cicatricial contractions after burns on the flexor sides of extremities.

An incision is made, beginning slightly below the margin of the plantar fascia on the inner side of the foot, at a point on a line directly below and anterior to the internal malleolus, extending forward and upward to a point on the first



metatarsal bone and nearly to the metaphalangeal articulation. A second incision is made, beginning at a point over the astragalo-scapoid articulation, extending forward and slightly downward, joining the first incision near the metatarso-phalangeal joint forming a V (Fig. 1). The incisions are made deep so as to include the subcutaneous tissue and fat. This flap is dissected backward to the points first indicated. (Fig. 2.) We have now exposed all the shortened soft structures. We first sever diagonally the inner fasciculus of the plantar fascia. The diagonal division of the plantar fascia is done, so that after correction there shall not be left a defect

between the divided ends, but that the points of the incised fascia still come in contact, thereby lessening the tendency to contraction of this structure when repair is complete. The remaining structures are now divided successively as directed by Phelps, until the astragalo-scaphoid capsule is reached. Instead of dividing this, we make another incision on the outer side of the foot over the head of the astragalus, pushing aside the tendons and soft structures and exposing the neck of that bone, and then cut through the neck with a chisel. We can now push the forward part of the foot outward without separating the astragalo-scaphoid articulation which nearly always occurs in the typical Phelps's operation. Occasionally, however, in old inveterate cases, it becomes necessary to remove the head of the astragalus. The foot is over-corrected, the varus has been turned into a valgus. The equinus position can now be relieved by subcutaneous division of the tendo Achillis. If there is bleeding from the wound on the inner side of the foot, it can be controlled by catgut ligature. The triangular flap is then turned back, it covers the wound except at its anterior point. (Fig. 3.) No sutures are employed. A perforated silk protective covers this wound. The outer wound, over the head of the astragalus, is closed with catgut. An antiseptic dressing is applied, and over this a retentive dressing of plaster of Paris beginning at the toes, extending above the knee, including one-third of the length of the thigh. This case is undisturbed for five or six weeks. On its removal the wounds have completely healed.

It is nearly four years since we employed the triangular flap method, and it has been done in twenty-five cases, in several instances on both feet at one sitting. The method has been employed *only in old, inveterate, and relapsing cases*. Experience has shown that the vast majority of club-feet can be corrected by manipulation, *brisement forcé*, and subcutaneous tenotomy. In several old cases of paralytic deformity, various modifications of this operation, together with tendon anastomosis and tendon elongation, have been done. Alto-

gether, the method has been more satisfactory, in suitable cases, than others heretofore employed. With this method, like all others, an observation of the case for several years must be insisted on. A partial recurrence will take place in a certain number of cases unless retentive apparatus, suitable to each case, is employed.

The advantages of the triangular flap are:

(1) The flap, on account of its broad attachment, is not likely to slough.

(2) The flap is thick, and it more completely fills up the large gaping wound than any other flap.

(3) The defect left underneath the flap fills with a blood-clot, facilitating connective-tissue formation by gradual displacement of the blood elements. The healing process is identical with the blood-clot as first produced in bone cavities by Schede, and which he called organization of the thrombus.

(4) We have no broad and deep granulating surface, causing, when epidermization is complete, abrupt and shelving sides.

The advantages of dividing the plantar fascia diagonally from before backward are:

(1) No dead space is left between the ends of the severed fascia.

(2) The points of the divided fascia still touch, and can be sutured if deemed advisable.

The division of the neck of the astragalus obviates the necessity of opening the astragalo-scaphoid joint, and prevents the separation of these joint surfaces, which always become recoaptated, contributing towards relapse.

CONTRIBUTION TO THE SURGERY OF EMPYEMA OF THE THORAX IN CHILDREN.

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TWENTY-THREE cases of empyema of the thorax in children, two of which were double, have been treated in the Methodist Episcopal Hospital in Brooklyn during the ten years ending January 1, 1898. Of this number, two, one double and one single, developed in the hospital as complications of other affections; the first in a case of abscess of the brain with meningitis, following a compound depressed fracture of the skull in which a scarlatinal eruption appeared two days after the accident; and the second in a case of pneumonia associated with hip-joint disease and double otitis media purulenta. A third case was admitted with an extensive hip-joint abscess in addition to the empyema. Five cases were admitted with sinuses, three resulting from previous operations and two from spontaneous external evacuation. One had pyopneumothorax from spontaneous internal evacuation, and in two others the histories point to a similar occurrence.

Family History.—This was negative in twelve cases, tubercular in three, fair in one, and not recorded in seven.

Previous Health.—This was good in nine cases, delicate or subject to bronchitis in nine, negative in one, and not recorded in four.

Age.—Three were three years of age; two, four years; six, five years; two, seven years; three, eight years; three,

nine years; one, ten years; two, eleven years; and one, thirteen years.

Sex.—Fifteen were males and eight females.

Side.—The left side was involved fourteen times, the right seven times, and both twice.

Etiology.—Eleven cases were said to have been preceded by pneumonia, ten by pneumonia or pleurisy, and in two there was no record on this point. Two cases were preceded by injuries to the chest, and, as has been already stated, three complicated or accompanied other diseases.

Duration of Pulmonary Symptoms.—In four cases, four weeks; in one, five weeks; in two, six weeks; in three, seven weeks; in one, eight weeks; in one, two months; in one, three months; in two, six months; in one, eight months; in one, two years; in one, two and a half years; in one, four or five years; and in two (both acute cases), not recorded.

In the two cases that developed within the hospital the physical signs of fluid in the chest were manifest in three and nine weeks, respectively, after the onset of pulmonary symptoms; the latter had been ill with cough, etc., for five weeks, and presented the characteristic signs and symptoms of pneumonia on admission; four weeks afterwards, these gave place to those indicating the presence of fluid, which, on aspiration, was found to be purulent.

From this it will be seen that the duration of pulmonary symptoms was from three weeks to three months in seventeen, or about three-fourths of the cases, and from six months to four years in six, or about one-fourth.

Of the latter six, in which symptoms had existed for six months or over, when admitted, four had sinuses of one-half, two and a quarter, two, and four years' duration respectively; the first from spontaneous external evacuation two months after the beginning of symptoms; the second from operation three months after the beginning of symptoms; the third from spontaneous external evacuation, previous duration of disease not recorded; and the fourth from operation at an unknown period after the beginning of symptoms. Of the

remaining two, one gave a history of spontaneous internal evacuation two and a half months before, and the other was pointing externally on admission.

One other case was admitted with a sinus, the result of operation four weeks previously; two others were pointing on admission, one at eight weeks and one at two months after the onset of symptoms; and a fourth, of seven weeks' duration, gave a history of spontaneous internal evacuation two weeks before.

Omitting the case of double empyema, in which the duration of pulmonary symptoms before admission is not recorded, this leaves twelve cases, about one-half, which, at periods varying from three weeks to three months, an average of six weeks, gave the physical signs of fluid (pus) in the pleural cavity, and in which no evidence of spontaneous evacuation was present.

Symptoms on Admission.—These as observed and recorded in thirteen uncomplicated cases were as follows: Fever, 13; cough, 10; no cough, 2; dyspnœa, 9; anæmia, 8; emaciation, 7; night-sweats, 6; pain and expectoration of pus, 3; cyanosis and œdema of eyelids, 2.

Fever.—The highest temperature observed on admission in twelve cases was 103.8° F., the lowest 99.2°, and the average 101.3°.

Pulse.—The highest pulse-rate on admission in eleven cases was 168, the lowest 110, and the average 137.

Respiration.—The highest respiration on admission in eleven cases was 84, the lowest 28, and the average 51.

In four cases admitted with sinuses the average temperature was 99.2° F., pulse 115, and respiration 26.

Physical Signs on Admission.—These as observed and recorded in thirteen uncomplicated cases were as follows:

Inspection.—Abscesses pointing below the nipple, 3 (two left, one right); diminished expansion, 6; bulging, 4; no bulging, 2; obliteration of intercostal spaces, 2; contraction, 1; cardiac impulse displaced, 3; not displaced, 2.

Palpation.—Fremitus absent, 1; diminished, 1; œdema of chest, 1.

Mensuration.—Increased one inch, 1.

Percussion.—(Below level of fluid) flatness, 10; dullness, 2. (Above level of fluid) dullness, 4; normal, 2; tympanitic, 1.

Auscultation.—(Below level of fluid) respiratory murmur absent, 6; diminished, 2; distant, 3; bronchial, 2; voice absent, 2; diminished, 3; distant, 1. (Above level of fluid) respiratory murmur bronchial, 3; diminished, 2; exaggerated, 1; voice bronchial, 1; exaggerated, 1; metallic tinkle, 1; moist râles, 2; friction sounds, 1.

The entire affected side was flat in one case, three-quarters of it in another, two-thirds in three others, and in most of the others flatness reached the angle of the scapula.

Treatment.—In all the more recent cases, the following routine plan was followed:

As soon as possible after admission, if urgent symptoms due to a large accumulation of pus were present, an aspirating needle was introduced through the eighth intercostal space, posterior axillary line, and the removal of the fluid continued until cough or other symptoms of embarrassed respiration or circulation demanded the discontinuance of the operation. On the following day, two days afterwards, or on the afternoon of the same day, usually under general anæsthesia, a section of the ninth rib, posterior axillary line, one and a half to two inches in length, was resected, the remaining tissues freely incised, and the pleural contents permitted to escape gradually; after which one or two large drainage-tubes were inserted and a copious absorbent dressing applied and firmly held in position by a binder secured by safety-pins and supported by shoulder-straps. Generally a single silkworm-gut suture was introduced into each end of the superficial incision, through which the resection was accomplished, and always a large safety-pin passed through the external extremities of the drainage-tubes to prevent them from falling or being pushed or drawn into the pleural

cavity. A bit of iodoform gauze passed around the tubes beneath the safety-pin protected the skin from contact with the latter.

After the operation the absorbent dressing was changed as often as it became saturated with the discharge, and as soon as the latter had practically ceased the drainage-tubes were removed and the opening in the chest permitted to close.

The patients were permitted to lie in any position they chose, and, as soon as they felt inclined, to sit up and to walk about.

This, together with the internal administration of tonics and a nutritious diet, constituted the entire treatment in uncomplicated cases.

In the early history of the hospital, sections of four ribs, fourth to seventh, were resected in one case (Case II), and in many instances the pleural cavity was flushed with various solutions immediately after operation to facilitate the escape of the pus and fibrin. So, also, it was the custom to irrigate the pleural cavity whenever a change of the dressing became necessary. For several years, however, no irrigations, either at the time of operation or subsequently, have been done in cases which pursued a normal course towards recovery.

In cases admitted without urgent symptoms, generally those in which the collection of pus was small, no preliminary aspiration was done.

Aspiration.—Aspiration was done in nine cases. In one, only a few drops of pus were withdrawn; in two others no further operation was attempted on account of the desperate condition of the patients, the empyema being a late complication of other mortal diseases; while in six others the operation was done as a preliminary to rib resection and permanent drainage, with a view to affording immediate relief from urgent symptoms and preparing the patient for the more severe operation.

In one of these cases the temperature chart was lost, in another the aspiration was done on the day of admission, and

the chart does not show the effect of aspiration on the vital signs, while in a third both operations were done on the same day, one in the morning and the other in the afternoon.

There are, therefore, but three cases—VII, XII, and XVIII—in which the effect of aspiration upon the vital signs can be studied. The average temperature, pulse, and respiration of these three cases was, on admission, 101.7° F., 154, 71; after aspiration, 99.3° , 135, 59; after operation, 99.6° , 127, 48.

Now, while it will be readily admitted that the number of cases aspirated before operation is too small upon which to base calculations as to results or to institute comparisons with other methods of treatment, when it is taken into account that this procedure was adopted only in those cases in which the collection of fluid was large and the respiration and circulation consequently seriously embarrassed, as indicated by a comparison of the vital signs on admission of all the aspirated cases with those in which no aspiration preceded rib resection, in the opinion of the writer the favorable influence of the preliminary aspiration can scarcely be overestimated. These comparative averages of vital signs on admission are as follows: Aspirated cases: temperature, 101.8° F.; pulse, 150; respiration, 64; cases not aspirated: temperature, 100.9° ; pulse, 127; respiration, 40; averages in all cases: temperature, 101.3° ; pulse, 137; respiration, 51.

The averages of the vital signs on the afternoon of the day of operation, for all cases (excluding those admitted with sinuses) in which rib resection was done in conjunction with incision of the pleura, is as follows: Temperature, 99.9° F.; pulse, 125; respiration, 43. On the following afternoon the averages for these cases were: Temperature, 99.4° ; pulse, 122; respiration, 40.

From a study of these averages of the vital signs it will be seen that the effects of aspiration upon the temperature, pulse, and respiration were almost as pronounced as the radical operation.

Pleural Contents.—Two of the cases afterwards submitted

to rib resection were aspirated twice; twenty-four ounces of pus being withdrawn, in one, two days before and four ounces more on the day of the major operation; while in the other, eight ounces were removed three days before and sixty ounces the day before resection.

The total of aspirated fluid was, therefore, for these two cases, respectively, twenty-eight and sixty ounces. In the remaining four the amounts were thirty-two, six, eighteen, and fifteen ounces. The total amount for the six cases is 167 ounces, and the average about twenty-eight ounces. The average age of these six patients was about six years.

The pleural contents at operation were estimated and recorded in four of these cases at eight, ten, eighteen, and six ounces, while in one of the remaining two the quantity was stated to be large, and the history of the other contains no note upon this point. The total for these four cases is forty-two ounces, and the average ten and a half ounces.

By adding the average amount evacuated at operation in these four cases with the average amount removed by aspiration in the six, we have an average total of thirty-eight and a half ounces removed in all cases submitted to preliminary aspiration. It is to be regretted that the amount of the pleural contents at operation was estimated and recorded in only four cases in which no aspiration was done. The amounts in these cases are, respectively, six, sixteen, six, and four ounces, an average of eight and a half, the average age in these four cases being seven years, which is also the average age of all the cases. Now, if we take the bulk of the pleural contents, in conjunction with the vital signs on admission, as an index of the comparative condition of the patients, the favorable influence of preliminary aspiration in suitable cases will be still more apparent. The largest amount of pus removed in any of the cases was seventy-eight ounces, in Case XVIII, and the smallest four ounces, in Case XXII.

In addition to pus, which was variously described as thin, thick, green, greenish-yellow, and foul-smelling (in an old sinus case), in many of the cases the presence of fibrin in

greater or less amount was noted, and in two cases drainage-tubes were removed from the pleural cavity. In one of these, Case X, a sinus had persisted for four years, and there is nothing in the history to indicate that the presence of the tube was suspected. In the other, the accident happened while the patient was in the hospital, because of neglect to introduce a safety-pin into the external extremity of the tube before reapplying the dressings. The loss of the tube was at once recognized, and no time lost in its removal.

Anæsthesia.—The ethyl chloride spray was generally used for local anæsthesia before aspiration, general anæsthesia not having been resorted to for this purpose. For the more severe operation of rib resection, chloroform anæsthesia was generally adopted,—twenty-one times. The stimulating effects of ether upon the circulation were responsible for its use in two cases, and in two others, whose condition did not warrant the use of any general anæsthetic, cocaine proved eminently satisfactory as a substitute.

Primary Results.—Including those admitted with sinuses, there were eight complicated and fifteen uncomplicated cases. The latter will be considered first.

One being double, the fifteen cases included sixteen empyemas. All were submitted to rib resection except one, Case VIII, admitted eight weeks after an injury to the chest, followed by the development of an abscess beneath the left nipple in conjunction with the symptoms and physical signs of intrathoracic disease. This case was discharged cured forty-seven days after incision of the abscess and the removal of a few drops of pus from the pleural cavity by aspiration, no connection between the pleural cavity and the external abscess having been discovered.

Of the remaining fourteen, two, Cases XVIII and XIX, died. The first developed pneumonia of the opposite lung the day after operation, and died in a week. This was a girl of seven, admitted seven weeks after the beginning of her illness, with pyopneumothorax, from whose pleural cavity seventy-eight ounces of pus were removed, sixty-eight by as-

piration and ten after resection. The operation was done under cocaine and was well borne, but the lung failed to expand, and the discharge remained profuse until death. The pulmonary conditions were confirmed by autopsy.

The second fatal case contracted scarlet fever and diphtheria seven weeks after operation, and was removed to the hospital for contagious diseases, where he died one week later, nephritis having been added to the other complications. The drainage-tube had been removed on the twenty-first day, and the sinus had closed, but reopened before he left this hospital.

In two of the cases the records are incomplete and do not state the exact time at which the drainage-tubes were removed and the sinuses healed. In two others, Cases VII and XXI, healing was delayed. In Case VII, owing to premature removal of the tube, the sinus closed and the pus reaccumulated on two occasions, necessitating the reopening of the sinus and the reposition of the tube at intervals of approximately one and two months after operation. The discharge continuing, four months after the first operation, at which a section of the tenth rib was removed, a section of the ninth rib was resected, exposing a small cavity, which healed under iodoform gauze packing in about two months.

In Case XXI the drainage-tube was lost in the pleural cavity one month after operation, and a section of the eighth rib was resected to facilitate its removal. The discharge persisting, two months and a half later the sinus was dilated and curetted and a larger and longer tube inserted. This tube was afterwards gradually shortened, and finally removed in about three weeks. After this the temperature remained normal and the physical signs gave evidence of complete expansion of the lung, but the sinus failed to close, and exploration revealed a shallow cavity extending upward beneath the seventh rib. In order to freely expose this a section of that rib was resected, together with the protruding ends of the rib below. This cavity, about two inches in diameter, and

lined with granulation tissue suggesting tuberculosis, was thoroughly curetted and packed with iodoform gauze. The case is still under treatment.

In the remaining eight cases, embracing nine empyemas, the average time at which the drainage-tube was removed and the sinus completely healed was, respectively, twenty-six and forty-two days, the extremes for drainage being eight and forty-seven days, and for complete healing twenty-two and fifty-six days.

Of the complicated (exclusive of sinus) cases, Cases XIII, XV, and XVII, in only one was anything more radical than aspiration attempted. In this, Case XV, in which the empyema was associated with an advanced stage of hip-joint disease with abscess, the abscess of the hip and the empyema were both submitted to operation on the same day, about a pint of pus being evacuated from each. The drainage-tube was removed from the chest on the seventy-ninth day, and the sinus was completely healed on the eighty-sixth. The hip sinus was closed four weeks later, and six months after admission he was discharged with a Thomas splint, patten, and crutches.

Case XIII, a puny boy of four years, admitted with pneumonia and hip-joint disease with abscess, after four weeks developed empyema, and was aspirated twice, with an interval of two weeks. Incision of the abscess of the hip, without anæsthesia, revealed extensive disease of both the head of the femur and the acetabulum. He also developed double otitis media purulenta, and died of exhaustion two months after admission, his condition after the development of the empyema never having been such as to justify radical measures for its relief.

Case XVII had sustained a compound comminuted fracture of the cranial vault thirteen days before admission, and gave a history of a scarlatinal eruption two days later, followed, in three days, by aphasia and the gradual development of complete right-sided hemiplegia. The hemiplegia was present on admission, and a large area of the scalp in the vicinity of the wound was in a condition of septic infec-

tion. Exploration revealed depression of the fracture, and beneath it a large cerebral abscess, which was opened and drained. Soon after admission he developed hypostatic pneumonia, followed by double circumscribed empyema. He died of septicæmia in about three weeks, the autopsy revealing the presence of other septic foci in addition to those already enumerated.

Of the sinus cases, Case XIV, in which no resection was done, left the hospital in eleven days, and was well one month later; Case VI left the hospital well in thirty-six days; Case X in forty-three days; Case XVI left the hospital in nine days, and was well six months afterwards; and Case II left the hospital twenty-seven days after operation, and was well at a subsequent unknown period.

ULTIMATE RESULTS.

CASE I.—Three and a half years after operation he was in good health, and had no symptoms referable to the chest. He had a right concave scoliosis of so marked a degree as to produce a noticeable deformity. The lower portion of the right chest was contracted, and the left had undergone compensatory hypertrophy.

CASE II.—Present condition unknown.

CASE III.—Present condition unknown.

CASE IV.—Nineteen months after operation, robust; no symptoms referable to chest. On the right side, below the seat of operation, percussion dull and breathing faint; on the left slight dulness, normal respiration; slight dorso-lumbar kyphosis.

CASE V.—Seventeen months after operation, no symptoms referable to chest; physical signs normal; slight right convex dorsal scoliosis.

CASE VI.—Seven months after operation she was well and strong, the sinus having remained closed; at this time it reopened and she has not been heard from since.

CASE VII.—Five years after operation, patient robust; no symptoms referable to chest; slight dorso-lumbar scoliosis, convexity to left; left chest measures three-quarters of an inch less than right; dulness and distant voice-sounds and respiratory murmur below angle of scapula.

CASE VIII.—The tendency to scoliosis was so marked in this case that a plaster-of-Paris jacket was applied at the time of his discharge. Nine months later the jacket was removed and the scoliosis had disappeared.

CASE IX.—Present condition unknown.

CASE X.—Present condition unknown.

CASE XI.—Two and a half years after operation in excellent health; the affected side measured half an inch less than the other, and there were slight dulness and diminution of voice and respiratory sounds.

CASE XII.—Remained well until, two years after operation, he contracted scarlet fever, and died of a complicating nephritis and pneumonia of the opposite lung.

CASE XIII.—Died. (See primary results.)

CASE XIV.—Twenty-one months after admission he was in excellent health, and had nothing but the scar to indicate his former trouble. Measurements of the chest and physical examination failed to reveal any difference between the two sides.

CASE XV.—Eighteen months after operation, in excellent health; left chest measured five-eighths of an inch less than the right, and some contraction was noticeable; the physical signs, however, were practically the same on both sides.

CASE XVI.—Eighteen months after operation, about two years after the beginning of her illness, in excellent health; the right side measured three-quarters of an inch less than the left, and there was a dorsal scoliosis with convexity towards the right; slight dulness on percussion, but good respiratory murmur.

CASE XVII.—Died. (See primary results.)

CASE XVIII.—Died. (See primary results.)

CASE XIX.—Died. (See primary results.)

CASE XX.—Six months after operation, in perfect health; no deformity; mensuration and physical signs negative.

CASE XXI.—Still under treatment. (See primary results.)

CASE XXII.—Three months after operation the left side measured one-half inch less than the right, but the physical signs were practically normal. A marked tendency to scoliosis, which was manifest soon after operation, had entirely disappeared, and he was in excellent health.

CASE XXIII.—Three months after operation there was a slight scoliosis, with the concavity towards the affected side; the physical signs and mensuration were equal; health excellent.

Conclusions.—A careful review of the preceding analysis seems to justify the following conclusions:

(1) Empyema is more often met with in children who are subject to bronchitis.

(2) Males are more frequently affected than females, and the left side more commonly than the right.

(3) Empyema in children generally follows pneumonia, the interval varying from a few days to a few weeks.

(4) In all cases of delayed or interrupted convalescence from pneumonia in children empyema should be suspected.

(5) If not previously relieved by operation, spontaneous evacuation may in the majority of cases be anticipated in from two to three months after the onset of pulmonary symptoms.

(6) Spontaneous evacuation, whether external or internal (through a bronchus), rarely results in cure of the disease.

(7) The usual symptoms of empyema in children are fever, cough, dyspnoea, anæmia, emaciation, and night-sweats; the usual physical signs, diminished expansion, or bulging, or both, of the affected side, displacement of the cardiac impulse, when the empyema is left sided, and flatness, with absent, distant, diminished, or bronchial voice and respiratory murmur below the level of the fluid.

(8) Because of its insidious development, as well as the diversity of the symptoms and physical signs which characterize its occurrence as a complication or sequel of a great variety of other affections, it is not infrequently overlooked or its manifestations misinterpreted, errors which would generally be avoided by the earlier and more frequent use of the aspirating needle for diagnostic purposes.

(9) By its earlier recognition and the prompt institution of appropriate surgical treatment the duration of the disease may be materially curtailed and the death-rate considerably lowered.

(10) As in abscesses in other portions of the body, incision and drainage, under appropriate antiseptic or aseptic

precautions, in the majority of cases yield the most satisfactory results.

(11) In ordinary cases, resection of a portion of a single rib, preferably the ninth in the posterior axillary line, should precede incision of the pleura.

(12) Where the collection of fluid is large, a preliminary aspiration should be done twenty-four or forty-eight hours before rib resection.

(14) The condition of the patient frequently contraindicates the use of a general anæsthetic.

(15) The drainage-tube should be large and not too long, and should not be removed until the cavity has been obliterated by the expansion of the lung and the discharge has ceased.

(16) Primary irrigation, curettage, and multiple rib resection are contraindicated in children, but either or all may contribute to the close or obliteration of a persistent sinus or cavity.

(17) Patients should not be considered cured as long as a sinus remains.

(18) In uncomplicated cases the greatest danger to be apprehended after operation is the development of pneumonia in the opposite lung.

(19) The temperature in uncomplicated cases is not high before operation, and generally falls and remains normal afterwards. A rise in temperature after operation usually indicates imperfect drainage or the onset of pneumonia.

(20) In average cases the drainage-tube may generally be removed in from three to four weeks, and a cure expected in from one to two months.

(21) In cases in which appropriate surgical treatment follows prompt recognition of the disease, speedy recovery without appreciable deformity, and with but slight modification of the physical signs over the affected area, may be confidently anticipated, while neglected cases not only present grave immediate dangers, but frequently result in palpable physical defects.

THE SURGICAL TREATMENT OF ACUTE INFECTIVE ARTHRITIS AND CELLULITIS (ACUTE ARTICULAR RHEUMATISM).

By JOHN O'CONOR, M.D.,

OF BUENOS AIRES,

SENIOR MEDICAL OFFICER OF THE BRITISH HOSPITAL AT BUENOS AIRES.

SINCE my first paper on this subject was published in the *Glasgow Medical Journal*, October, 1897, I have had the opportunity of further testing my treatment in nine consecutive cases, and the results obtained fully confirm the opinion previously expressed, that arthrotomy and free incisions are a specific cure for the disease known as acute articular rheumatism, and the more I am brought into operative contact with this malady, the less hesitation have I in stating that the word rheumatism is a pathological misnomer.

I wish also to emphasize a previous statement, that this is an infective disease, caused by germs (or their products) which enter the human body through the tonsil or other microbial trap-door. Doubtless we all have some of this poison lying latent in our systems, which under certain conditions, notably exposure to cold or damp, arouses itself into activity, and attacks one or more joint regions, general toxæmia ensues, and if prompt surgical treatment is not adopted, other articulations, and the heart frequently, become infected.

I have just read in the April number of the *Medical Standard* that MM. Triboulet and Cayon consider that they have discovered a diplococcus which must be held clinically responsible for the disease.

I hope that this is true, for, if so, there will be no longer a doubtful link in my theory as to the causation of acute infective arthritis and cellulitis.

The information derived from ten consecutive cases of this infection, surgically treated, tends to strengthen my belief that in many respects it bears striking resemblance to gonorrhœal arthritis and pyæmia.

In all my cases general toxæmic symptoms disappeared by the fourth day after operation, no recurrence took place *in situ*, and no metastasis followed in any other articulation or in the heart. Luckily, in no instance was there any pre-operative endo- or pericarditis, but, as stated elsewhere, the existence of such a complication would not deter me from operating; on the contrary, the infected articular regions *must be fearlessly attacked in order to prevent further destruction*, for infected joints serve as incubators for the virus.

I can truly state that in my surgical experience I have never met with a disease which responds more readily to the knife, the immediate relief which follows operation is most remarkable, and curative results are so rapidly brought about that I no longer hesitate in operating on every case of acute or subacute infection as soon as the diagnosis is made. And now I no more think of giving a "rheumatism" case salicylate of soda than of administering quinine to a patient suffering from ischio-rectal abscess.

As far as the danger of opening and draining joints is concerned, I again repeat that a joint may be opened and drained for weeks without any risk of septic contamination or loss of function.

I have frequently been astonished with the anti-inoculable properties of the synovial fluid, so much so that I have come to the conclusion that it is by no means an easy matter to infect an open draining joint. In proof of this assertion I will mention an interesting case.

October 1, 1896, I performed arthrotomy with drainage on a right knee-joint for chronic rheumatic effusion, of four years' duration, which had resisted many methods of treatment by various doctors, the gauze drain was left out on the fifth day, and as the wound had apparently healed up to skin level, patient was discharged as cured on October 28.

Two months later he returned to report himself, and stated that a few days after leaving hospital "my wound opened slightly, and since that time there has been a constant leak." I anxiously awaited the removal of the trousers, and then, to my disgust, I saw a stream of normal synovial fluid running down his leg (his sock was sodden with it), flowing out of a small opening in the cicatrix. I begged him to enter hospital in order that I might close the fistula, but he replied, "Oh, she's all right. I've no time. I'll wash it every night; my knee is as strong to-day as on the day I enlisted in the Life Guards." He also stated that three days after he left hospital he returned to his work,—dock excavating,—and had not any return of the pain, stiffness, or swelling.

Two months later he sent word that the "running" had stopped, and when seen, a year later, the knee was normal. Thus four months' exposure to mud-shifting, trousers, and a Saturday-night lather failed to infect this patient's knee-joint.

For a long time I thought that arthrodial infection in this instance was prevented by some valvular condition of the fistula, but during the past twelve months I have observed that although the drainage wounds frequently become superficially necrosed and septic, from the constant presence of the mercurial gauze drain, yet in not a single instance did the synovial fluid become turbid or the interior of the joint become in any way contaminated. These facts deserve consideration, for they tend to prove that it is more easy to infect the cut tissues of wounds than the interior of joints, and I cannot explain the immunity in any other way, except by accrediting the synovial fluid with some antiseptic properties. I have also found that the interior of joints is by no means a sensitive structure, for constantly my patients painlessly perform active motion through a right angle with a half inch diameter roll of gauze stuck in the synovial pouch of the knee. Recently I have made it a practice to allow the patients out of bed as soon as their physical strength permits of it, for I find that walking acts beneficially in retarding the closure of the knee-joint, and this ensuring no reaccumulation of the excessive secretion which invariably takes place in these

cases. Needless to say aseptic dressings are applied until the wound has healed.

Early massage and passive movement are avoided, for although the former may be a useful and fashionable remedy for some old ladies who suffer from constipation or fat, yet it does not commend itself to me as a scientific or necessary adjunct to the primary surgical treatment of joints, and as for the latter, I prefer to utilize the patient's own senses, for in a thing of this sort I consider them more delicate and trustworthy. Unless with hysterical females or trembling drunkards I have never seen a patient refuse to move his joint when asked to do so,—*i.e.*, if movement was physiologically possible.

I read with much interest in the *Lancet* of March 19, 1898, a report of a discussion which took place in the Clinical Society (London) on the treatment of perforating wounds of the knee-joint. A surgeon mentioned three such cases on which he had performed arthrotomy, irrigation, and closure of joint, two of them afterwards became septic, and the ultimate results were one cure, one knock-knee, and one excision. I cannot help thinking that, if this gentleman had employed primary drainage, he would have at any rate been spared the operation of excision. I confess I was surprised to read that he defended a treatment which was attended by such disasters, and that another well-known surgeon stated in same discussion that "drainage was overdone." In order to put this matter to the test, I will here take the liberty of inviting the latter gentleman to publish the notes of his last twenty-two cases of arthrotomy of knee without drainage, and if any member of the Clinical Society or profession then wishes to compare results, he may do so by referring to my twenty-two arthrotomies of knee with drainage, published in the *Medical Press and Circular* of January 26, 1898, or in the April number of the *Medical Standard*.

In this matter of drainage I am somewhat concerned, for I think I am the first surgeon who has advocated and practised arthrotomy and drainage in all cases of traumatic

hæmarthrosis,¹ gonorrhœal arthritis,² acute and chronic traumatic effusion,³ and chronic rheumatic effusion,⁴ and as all my cases (thirty-four) have been successful, I should like to know what is to be gained by non-drainage.

The treatment of infected joints is, however, quite another matter, and I should think there are few surgeons to be found so utterly devoid of the sense of consequences as to sew up a joint in which they had found or even suspected septic or infective material.

In a paper recently written for the *International Medical Magazine*, I drew attention to the fact that in the cases of wrist and ankle (I may now add toes and shoulder) infection, on which I have operated, the lesion was an infective "watery" cellulitis, and in no instance was there a trace of any arthritis present, and that the only articulation in which I have invariably met with arthritis is the knee, therefore I think the best pathological name for this disease is infective arthritis and cellulitis.

CASE I.—C. H. B., aged forty-one years, admitted June 21, suffering from acute rheumatism. Symptoms on admission were: temperature 102° F., tongue thickly coated, pulse 80, continuous sweating, anorexia, urine scanty, highly colored, with a trace of albumen, slight pain in left elbow without swelling. Both knee-joints were swollen and painful. Patella floating, with some periarticular inflammation and slight cedema.

Notwithstanding a liberal and prolonged use of the salicylates, alkalies, turpentine, quinine, flannel, blankets, and fluid diet, the case gradually assumed a threatening type.

July 17. arthrotomy of right knee was performed, and four ounces of turbid serum with many large masses of lymph were removed. July 24, arthrotomy of left knee was done and six ounces of similar stuff evacuated. All constitutional symptoms disappeared after the second operation. Stiffness gradually be-

¹ New York Medical Journal, November, 1896.

² ANNALS OF SURGERY, February, 1898.

³ Glasgow Medical Journal, December, 1896.

⁴ Medical Press and Circular, January 26, 1898.

came less, and he was discharged with fair movement on September 17. Two months later, when he presented himself for inspection, he could walk without a limp, joints found normal in appearance, and general health excellent.

CASE II.—P. G., aged fifty-nine years, admitted November 12, 1897, suffering from acute infection of both knee-joints, with a temperature of 103° F., profuse sweating, blankety tongue, scanty, highly colored urine, constipation, and anorexia. As medical treatment showed no tendency to reduce the swelling of knee-joints or relieve the general toxæmia, double arthrotomy was performed on November 18. Three and a half ounces of flocculent serum were removed from right knee, and four ounces from left. Irrigation with drainage for four days. Constitutional symptoms promptly disappeared. Patient was allowed out of bed on November 28, and discharged cured December 6.

CASE III.—I. G. T., aged forty years, stationmaster, was admitted to the British Hospital December 16, 1897, suffering from acute rheumatism. History: Twelve years ago, after recovering from a contusion of right leg, he suffered from an attack of gout in left great toe, which lasted for ten days. A year later his left ankle became swollen, and he was laid up for five days with what his doctor called "a touch of rheumatism." During the ensuing eleven years he frequently suffered from painful and swollen joints, at times necessitating his remaining in bed for weeks. He never had gonorrhœa or any other disease.

On admission, temperature was 101.4° F., tongue furred, profuse sweating, urine scanty, highly colored and albuminous. He complained of intense pain and stiffness in left ankle, right knee, and left elbow. There was considerable periarticular inflammation about ankle, and the slightest attempt at active or passive movement caused excruciating pain. The right knee was swollen, distended, immobile, and painful to touch, and the left elbow was swollen, fixed, and tender.

Sodium salicylate (twenty grains) was administered every two hours, joints were enveloped in flannel, and milk diet given.

As no improvement had followed after two days of this treatment operation was decided on, and on December 18 the left ankle-joint was opened by a small incision parallel to inner border of external malleolus, nothing but synovial fluid being found.

Multiple incisions were then made through the swollen and

inflamed periarticular structures, the cellular tissue was freely opened up, capsule extensively exposed, and presenting tendon sheaths incised, all the wounds were irrigated and packed with perchloride gauze. In fact, the treatment adopted was identical to that in septic cellulitis.

The right knee-joint was opened by a two-inch incision and six ounces of green, turbid, flocculent (almost purulent) serum removed. Many flakes were detached from recesses of joint by index-finger, and removed by irrigation, finally a gauze drain was inserted.

The left elbow-joint was exposed and opened by a three-inch incision to outer side of olecranon, and a tablespoonful of turbid serum was removed,—irrigation and drainage. He moved his elbow normally on second day, ankle on third, and knee on sixth. Temperature fell to and remained at normal on the third day. He was allowed out of bed December 25, and partook of a full meal. A week later he was able to walk about, and was discharged cured January 10.

Before leaving he said, "I was as bad when I entered the operating room as when I was admitted to hospital, and on waking up from chloroform my pains were gone."

CASE IV.—J. F., aged forty-three years, workman, was suddenly taken ill on November 25, 1897, with pain and swelling in both wrists, and a few days later both knees became similarly involved.

Past history excellent; never had gonorrhœa or any serious disease. He remained under the care of a local doctor until December 6, and as the swelling, pain, and stiffness of wrists continued, he sought hospital treatment on this date.

On admission temperature was 102° F., with all the classic symptoms of rheumatic fever, both wrists were red, tender, swollen, and stiff; left knee was slightly swollen, distended, and fixed.

Salicylates, flannel, and milk diet were most assiduously tried by the junior medical officer, Dr. Halahan, until the 19th of December, when my colleague asked me to particularly inspect the patient, as he was becoming very emaciated, lost all appetite, fever and sweats continued, and the condition of the joints had become worse.

December 20 both wrist-joints were opened, and nothing

abnormal found in their interior, the inflamed surrounding structures were most freely opened up by multiple incisions, and a quantity of serum escaped. The wounds were irrigated and packed with gauze. Arthrotomy was then performed on left knee, and two ounces of the usual dirty serum removed,—irrigation and drainage. Temperature became normal in forty-eight hours, and when dressed on third day there was not a trace of rubor, dolor, tumor, or calor about wrists or knees, and, what is more wonderful, patient voluntarily moved the three joints through their normal range without the least pain. December 24 he was allowed out of bed and given farinaceous diet; 27th he walked out to the garden; full diet. Not a trace of the disease having reappeared, he was discharged cured January 11.

CASE V.—T. D., aged forty, painter, admitted to hospital February 24, 1898. History: Ten months ago he "caught cold" and suffered from pain and swelling in left hand and wrist.

These symptoms gradually disappeared without treatment. Three months later pain returned in wrist, and two months afterwards the left ankle and foot became swollen and stiff, and for the succeeding five months he was unable to walk. Condition on admission: He was unable to walk, carried his left arm in a sling, and presented a worn-out appearance. Temperature 99.3° F., anorexia, tongue furred, slight sweating, urine scanty, highly colored, no albumen. His left foot was swollen, red, tender, and stiff, any attempt at passive movement caused intense pain. The left wrist was precisely in a similar condition, no pain or swelling in any other joint, and no organic disease. Past history: Never had syphilis; led a temperate life; no indication of plumbism; had gonorrhœa fifteen years ago, and never suffered previously from any joint trouble. Family history, *nil*. February 26 the dorsum of left foot was freely incised, the cellular tissue between tendon sheaths opened up, capsular ligament exposed, and ankle and three tarsal joints opened. A considerable quantity of serum oozed from the cut tissues, but the joints were found in every respect normal. The wrist was treated in a similar manner, but the joint contained no fluid.

Second day: Dressed; wounds aseptic; swelling had vanished; slight movement without pain. Fifth day: General symptoms had disappeared; free and painless movement in both articulations; asked for solid food. Tenth day: Allowed out of

bed. Twenty-fourth day: The wounds having healed, he was discharged cured, having full use of his hand and foot. Before leaving hospital he ran ninety yards in bare-feet on a tiled floor without a limp or ache.

CASE VI.—A. McC., aged twenty-six years, sailor, entered hospital on March 1, 1898. History: February 14 he caught a chill on board ship, and soon afterwards felt pain in left ankle. On the following morning his left knee became swollen and painful, he also had loss of appetite, fever, "dry" tongue, urine scanty and dark in color.

On admission his temperature was 100° F., tongue furred, and the left knee was considerably distended, flexed; patella floating, tender to touch, and painful to move; left ankle normal; no organic disease. Past history excellent; had gonorrhœa five years ago.

March 2: Arthrotomy; six ounces of greenish, turbid, flocculent serum removed. March 3: Dressed; slight active movement. March 7: Drain dispensed with; active movement through a right angle. March 9: Allowed out of bed, movement normal. March 19: A secondary skin suture introduced. Discharged cured and returned to work on March 28.

CASE VII.—J. F., aged forty-six, laborer, admitted March 1, 1898. History: February 22, slept in wet hay and caught a severe cold; February 23, the right knee and right ankle became swollen, stiff, and painful; February 27, left knee became similarly affected.

On admission temperature was 101° F., dirty tongue, profuse sweating, scanty, highly colored urine; both knee-joints were distended, flexed, and tender to touch. The right ankle and dorsum of foot were swollen, red, and painful; no organic disease.

March 2: Three long incisions were made on dorsum of foot, serum oozed from cut surfaces, but on opening ankle-joint nothing abnormal was found.

Arthrotomy was then performed on both knee-joints, four ounces of the usual muddy serum were removed from the right, and two ounces from the left. Third day: All symptoms of general toxæmia had disappeared. Fifth day: Drains left out. He was allowed out of bed March 14, and discharged cured March 30.

CASE VIII.—P. J., aged twenty-seven years, sailor, was admitted into hospital on 23d of April. History: April 18 he got "a severe cold on board ship." On the 19th left knee and left foot suddenly became swollen and very painful, accompanied with fever, sweats, and shivering, constant cough, and difficulty in breathing. April 21 the right knee and right foot became similarly involved, and on the 22d pain and swelling commenced in right shoulder.

On admission patient presented a livid appearance; heart-sounds feeble; respirations, 38; pulse, 110; temperature, 101° F.; tongue furred and dry; bathed in perspiration; both lungs were extensively affected with bronchitis, with slight basic congestion. He had a most troublesome cough with abundant muco-purulent sputum; urine highly colored and albuminous; no endo- or pericarditis could be detected. The right shoulder was fixed, swollen, and tender; both knees were distended, painful, and immobile; and the dorsum and sides of both feet and ankles were extremely inflamed and painful.

Notwithstanding the pulmonary complications, I determined to get the "rheumatism" out of him at once, and on the same day, in the presence of Dr. Graham Pilgrim, of this city, and Dr. Fedarb, of H. M. S. "Swallow," I freely incised both feet; serum poured from the cut subcutaneous tissues, and as Dr. Pilgrim aptly remarked, "The condition appears very like the cellulitis seen in cases of "grano malo" (anthrax); both ankle-joints were opened, but contained nothing abnormal.

Arthrotomy was next performed on both knees, and four ounces of turbid, flaky fluid removed from the right, and three ounces of similar stuff from the left.

The joints were irrigated with 1 in 5000 biniodide lotion, and gauze drains inserted. Finally the right shoulder-joint was opened, serum oozed from the divided tissues, but the joint itself was in every respect normal.

As the patient's condition under chloroform appeared very precarious, I was compelled to operate rapidly, and the whole business was concluded in twenty minutes.

He was promptly hurried to a warm bed, injected with strychnine and digitalis, and an enema of hot coffee and brandy administered.

I visited patient six hours later, and found him recovering

slowly, but satisfactorily, from the shock; chest symptoms were somewhat more aggravated, but he declared that all pain had left his joints. The hypodermic injections of strychnine and digitalis were continued every six hours; eucalyptus given internally and by inhalation, mustard poultices to back, oxygen gas every four hours, and warm milk and brandy every few hours, with a four-hourly enema of peptonized egg-nog.

Second morning: Cough slightly better; respiration, 34; pulse, 110; tongue becoming moist; wounds dressed; all were quite aseptic; swelling around joints had markedly diminished, tenderness gone, and the movement of the dressing caused no pain or inconvenience. Third day: Dressings changed; wounds healthy; slight, painless, active motion in each joint; no swelling, tenderness, or pain present; tongue cleaning; respiration, 30; bronchitis much less. Fifth day: Temperature remained at normal; movement in ankle- and shoulder-joints, and active motion through half a right angle in both knees. Sixth day: He was given full diet, and on the seventh day he was placed in a chair before the fire for an hour. Fourteen days later he was walking about with normal joints, no trace of rheumatism having reappeared in any part of his body. An uneventful convalescence ensued.

CASE IX.—V. R., aged forty-two, railway laborer, admitted to hospital May 6. History: On the night of April 25 he caught cold while sleeping in a draughty hut, accompanied with fever, shivering, and slight sweats. April 26 he felt acute pain in both wrists; on the 27th both feet became painful, and on the 28th the left one became swollen, tender to touch, and very painful to move. May 1: Pains had ceased in wrists and right foot, but the condition of the left foot became more intensified.

On admission his temperature was 99° F., tongue moist and furred, and the dorsum and sides of left foot were swollen and very much inflamed.

Past history: Never had any serious illness, and although he suffered from gonorrhœa in March last, no trace of the disease could be found on repeated examination of penis. May 7, assisted by Dr. Colbourne, of Berkhamsted, London, five four-inch incisions were made into area of tumefaction; the tissues appeared water-logged, and serum poured out of them when divided. The ankle-joint was then opened, but, as usual, nothing

abnormal was found therein; the wounds were irrigated and packed with gauze, and no splint applied. Temperature, on the evening after operation, was 100° F. May 8: Dressings changed; all redness, pain, and swelling had disappeared; free active motion. There is nothing further to note, as he made a rapid convalescence.

CASE X.—C. J., aged twenty-eight years, clerk, consulted me May 10 for "rheumatism" of right knee and right great and first toes. History: January 28 he was suddenly seized with pain in right hip, which necessitated his remaining in bed. February 1, ten days later, both feet became swollen and painful, and on the following day the toes became affected. February 14 pain and swelling started in right knee, and he also suffered from fever, sweats, and anorexia. He remained in bed until February 22, and since that date the swelling and stiffness remained at a standstill in right knee and toes.

Dr. Walker, of Santiago, who kindly sent the patient to me, wrote me a full account of the case, and of the treatment which he had adopted, which, in short, was large doses of salicylate of soda, blankets, flannel around joints, milk diet, and saline purges; later, potassium iodide and warm fomentations; and he stated, "notwithstanding all my remedies, I cannot get his right knee and toes well."

On admission patient was pale, thin, and presented a worn-out appearance. Temperature normal; no organic disease; but the right knee was distended, stiff, and painful to move; and the metatarso-phalangeal joints of both toes were red, swollen, and tender to touch.

May 14: Arthrotomy of right knee was performed; three ounces of turbid, flaky fluid removed; joint irrigated and drained. The tumefaction around toe-joints was then freely incised; serum escaped; but on opening the articulation nothing abnormal was found.

On the following day the knee had resumed its normal contour, and slight active motion was unaccompanied with pain; the toes were dressed on the second day; wounds aseptic; tumefaction and redness had disappeared; movements painless. May 17: The drain was left out of knee. May 19: He was allowed out of bed, having normal range of motion.

REPORT OF A CASE IN WHICH HALSTED'S
HAMMER WAS USED AS AN AID TO
THE SUTURE OF THE COMMON
BILE-DUCT.¹

By J. J. BUCHANAN, M.D.,

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SURGEON TO MERCY AND EAST END HOSPITALS.

MRS. W. J. M., fifty-one years old, was admitted to the hospital October 29, 1898. The family history was negative, as was her previous history prior to present trouble. This began about six years ago, when her first attack of biliary colic occurred. She was ill for two weeks, but no jaundice was present. She remained in good health (weight 185 pounds) until May, 1897, when a second attack took place, lasting three days, also without jaundice. The third and last attack began June 29, 1898, since which time the patient has never been well, acute exacerbations of pain coming on every few days and subsiding under morphine. Jaundice first appeared about August 1, 1898, and has gradually increased in intensity coincident with an intense pruritus. Gastric disturbance has been marked, and patient states that she has lost between thirty and forty pounds. When admitted, she complained chiefly of itching of the skin, so severe as to prevent sleep. The conjunctivæ and skin were deeply stained with bile pigment, while all over her body were papules and raw surfaces of various sizes, produced partly by scratching and partly by the cholæmic condition. The liver was somewhat enlarged downward, but there was no tenderness upon pressure at any point.

Diagnosis.—Stone in ductus communis choledochus.

On November 2, she was operated on at the East End Hos-

¹ Read at the November, 1898, meeting of the Allegheny County Medical Society. For the history of this case, as well as for efficient assistance in the operation, I am indebted to Dr. John DeVenne Singley, Assistant Surgeon to the East End Hospital.

pital under chloroform anæsthesia, in the presence of her attending physician, Dr. W. J. McDowell, of Scottdale, and his consultant, Dr. A. W. Strickler. An incision about fifteen centimetres long was made, beginning just above the edge of ribs at the ninth costal cartilage and extending down through the rectus muscle to the right of the umbilicus. After going through a very fat abdominal wall, the peritoneal cavity was opened and the under surface of the liver explored. It was necessary to separate many adhesions between liver and adjacent structures. The gall-bladder was recognized after considerable search as a small white body about one by four centimetres in size. Tracing down the cystic duct to the common duct, a hard mass was palpated in the common duct at its duodenal extremity. The wall of the duct was freely exposed, and two presection stitches of fine silk were placed about the middle of the duct. The field of operation was carefully walled off with gauze pads, and an incision one and a half centimetres long was made between the sutures previously introduced. The duct was dilated sufficiently to admit the little finger, which encountered a stone where it had been located by palpation of the duct. With a scoop and the finger, a calculus weighing a little over one gramme was extracted. The hepatic duct was deeply sounded for other stones and the sound passed without obstruction into the duodenum. A No. 12 Halsted hammer was then placed in position and four or five mattress sutures of fine silk inserted, after which the hammer was withdrawn and the sutures tied. Bile ceased to escape at once, and the duct was apparently perfectly tight. As a precautionary measure, however, a strip of gauze was carried down to the site of the sutures and brought out through the abdominal incision. The peritoneal cavity was then sponged dry and the peritoneum closed with a continuous suture of fine silk. The remaining structures were drawn together with interrupted sutures of silkworm gut. The subsequent course of the case was uneventful, the maximum temperature being 99.6° F. No bile escaped after operation.

As pointed out by Professor Halsted, in the *Johns Hopkins Hospital Bulletin* for April, 1898, suture of the bile-ducts has rarely been attempted, and it was for the purpose of facilitating such a procedure that he devised the small hammers, one of which was used with such satisfaction in this case.

They render an otherwise most difficult matter comparatively easy. The following advantages claimed by Halsted for these hammers can, I believe, be properly allowed:

(1) "The duct to be sutured can be drawn towards the incision in the anterior abdominal wall and within easy reach of the operator; it can also be manipulated nicely by the hammer.

(2) "The duct, whether normal or thickened and dilated, is gently expanded by the hammer; hence the stitches can be taken with great accuracy and without fear of including the opposite wall or of occluding the lumen of the duct.

(3) "The operation is a very clean one, because the hammer blocks the duct, and this prevents the escape of its contents and the contents of the gall-bladder.

(4) "With the hammer, wounds of thin normal ducts can be easily and almost infallibly sutured, and hence the surgeon may, if he chooses, fearlessly operate upon the common duct as soon as obstruction takes place."

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, December 14, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

POSTERIOR GASTRO-ENTEROSTOMY WITH MURPHY'S BUTTON FOR BENIGN STRICTURE OF THE PYLORUS.

DR. F. W. MURRAY presented a woman, forty years of age, who, three years ago, began to suffer from indigestion; after taking food there was pain, nausea, and vomiting.

The pain was especially severe, and was the most prominent symptom, so much so that the patient refrained from ordinary diet, and restricted herself to fluid food. She gradually lost flesh and strength and became quite weak. During this time the vomited matter never contained blood. About two years ago the pain after eating became less severe, and the nausea and vomiting became more marked. At varying intervals, generally every two days, the patient would vomit large quantities of mucus and undigested food, and relief followed until she took another meal.

The patient first came under Dr. Murray's observation in the spring of 1898. At that time she was very anæmic and emaciated, and complained principally of the discomfort caused by taking food. On examination the stomach was found to be greatly dilated, but no tumor could be felt anywhere. It was evident that a stricture of the pylorus was present; and, in order to ascertain the nature of the obstruction, the patient was sent to Dr. G. R. Lockwood for examination of the stomach contents. After several examinations, Dr. Lockwood reported that the hydrochloric acid was normal in amount and the pyloric stricture was undoubtedly benign in character.

Gastro-enterostomy was advised; but owing to business reasons, the patient decided to postpone the operation. She was then placed on a diet of milk and eggs, and the stomach was washed out daily. Improvement followed, the nausea and vomiting disappeared, and the patient began to gain strength.

On August 19, at the New York Hospital, a posterior gastro-enterostomy with Murphy's button was performed. When the abdomen was opened the stomach presented in the wound, and was found to be considerably dilated. The pylorus was found to be very much thickened and indurated, but there were no adhesions and no enlarged glands. The patient bore the operation well. On the day following the operation she was given milk in small quantities by the mouth, but up to the ninth day she was nourished principally through the rectum. Union of wound by first intention; silk skin sutures removed on the fifth day; bowels moved on the ninth day; patient sitting up in a chair on the eleventh day; button discharged on the sixteenth day, and the patient discharged from the hospital on the twenty-first day. Since the operation the patient has gradually and steadily regained strength, and her weight has increased from 85 to 115 pounds.

The obstruction in this case was undoubtedly due to cicatricial contraction following ulceration at the pylorus. The operation itself was fairly easy, but there was one difficulty found with the Murphy button. After inserting one-half of the button through the incision in the stomach, and then tightening up on the purse-string suture, it was found that the walls of the stomach puckered up to such an extent as to interfere with the union of the gastric half of the button with the other half which lay in the small intestine.

In the future, in performing a similar operation, Dr. Murray would make his incision in the gastric wall, insert the corresponding half of the Murphy button, and then unite the incision by a simple interrupted suture, thus avoiding the puckering caused by the purse-string suture. The result in this case has been an excellent one, and should a contraction of the new opening between the stomach and small intestine occur to such an extent as to cause obstruction, Dr. Murray would reopen the abdomen and do a pylorotomy.

DR. CHARLES K. BRIDGON referred to a somewhat similar

case which he had presented to the society about a year ago. The patient was a man who had been suffering for some time from a stenosis of the pyloric orifice of the stomach; no tumor was detected, and the cause of the obstruction could not be made out. As the patient's condition was desperate, a posterior gastro-enterostomy was done with the aid of Murphy's button. The man rapidly improved, and left the hospital about a month after the operation, returning to his occupation as a carpenter.

Dr. Briddon did not see him again until about ten days ago, when he returned to the hospital to be relieved of a neoplasm, which had developed in the cicatrix of the original operation. In removing this growth, which was nodular and extended along the entire length of the cicatrix, the abdominal wall was necessarily opened, although the growth itself did not invade the peritoneal cavity. It proved to be an adenoma. During the course of the second operation, Dr. Briddon said, he took occasion to examine the stomach, and found a carcinomatous condition of the pyloric end of the organ, about one and one-quarter inches in length, including about one inch of the stomach, and a quarter of an inch of the duodenum. In spite of this, the man's general condition was excellent.

The speaker said that, in a certain number of these cases, the posterior operation could not be resorted to. In two cases coming under his observation, where the malignant disease was far advanced, with much infiltration,—glandular and otherwise,—he had found it impossible to raise the colon, with its mesocolon, for a sufficient distance to do the posterior operation, and in both cases he had to resort to the anterior operation.

Dr. Briddon inquired why Dr. Murray would resort to a pylorectomy in preference to a pyloroplastic operation in a case of benign character, like the one under discussion?

DR. MURRAY replied that, in his case, there was no neoplasm of the pylorus, but cicatricial contraction due to ulceration. In such a case he thought a more permanent result was obtainable by doing a pylorectomy than by a pyloroplastic operation; after the latter recontraction would be more apt to occur.

DR. FRED. KAMMERER said he thought the operation of the future, in cases like the one reported by Dr. Murray, would be posterior gastro-enterostomy, even for the relief of cicatricial contraction of the pylorus. The use of the Murphy button has

made this operation both safer and easier, and if we could safely depend upon the evacuation of the button in every instance, or rest assured that its retention in the stomach would produce no ill effects, posterior gastro-enterostomy would probably be the operation of choice in every instance. At all events, there can hardly be any question that the proper way to deal with a malignant stricture of the pylorus is to do a posterior gastro-enterostomy first, and then resection. Carle and Fantino have reported many cases of posterior gastro-enterostomy, the operation in a large number of the same having been done for benign obstructions. If we may accept their experience with this operation, the unpleasant sequelæ of the anterior operation are most always avoided when posterior gastro-enterostomy has been resorted to.

Dr. Kammerer presented a patient in order to call attention to a new method of applying the Murphy button, which had recently been advocated by Carle and Fantino. The method is as follows: Instead of introducing the usual purse-string suture, an incision is made in the intestine about two-thirds as long as the diameter of the button, and through this incision, on the stretch, the button is forced into the bowel, without, of course, injuring the latter. Then a suture is applied on each side of the stem of the button, thus closing the incision in the intestinal wall. The two halves of the button are then closed.

The speaker said he had followed this method in three cases of posterior gastro-enterostomy during the past summer, and the results were very satisfactory. The speaker said he had not been pleased with the final adaptation of the two halves of the Murphy button in cases of anterior gastro-enterostomy when a purse-string suture had been used, in such cases the introduction of the button had always produced a puckering of the thick wall of the stomach which required the application of additional sutures. In two of his cases the button was passed in from one to two weeks; in the third it was never found.

INTESTINAL OBSTRUCTION DUE TO CARCINOMA; COLOSTOMY, AND SUBSEQUENT RESECTION.

DR. F. W. MURRAY presented a man, forty-six years old, who had been admitted to St. Luke's Hospital March 2, 1898. Family history good, and personal history negative, with the exception of an attack of typhoid fever when he was twelve years

of age. About two weeks previous to admission to the hospital he was suddenly seized with cramps in the lower abdomen; there was no nausea or vomiting, and the bowels moved slightly every day. The movements consisted of small, hard lumps, and the stool was accompanied by bearing down pains in the lower left abdomen. This state of affairs continued for ten days, when the constipation became complete and vomiting set in. Large quantities of greenish fluid were vomited at intervals and there were frequent gaseous eructations. On admission to the hospital the abdomen was greatly distended, very tympanitic and tense, with tenderness on pressure over the left pelvic region. No tumor could be felt through the abdominal wall. By rectum on pressing steadily upward the finger came in contact with a small mass high up and apparently outside of the right of the rectum. The patient's general condition was unfavorable. He was weak, semidelirious, temperature 102.5° F., pulse 120. After several ineffectual attempts to move the bowels by oil enemata, he was anæsthetized, and left inguinal colostomy performed. A large amount of gas and fluid fæces were evacuated. The patient stood the operation fairly well, and in a few days began to gain strength rapidly. For weeks later—that is, on March 31—he was again anæsthetized, the colostomy wound was thoroughly packed with iodoform gauze, and covered with rubber tissue, the edges of which were treated with chloroform, thus securely shutting off any chance of infection.

The peritoneal cavity was opened through a median incision in the lower abdomen; through this opening the sigmoid was found and traced downward, and about at the junction of the sigmoid in the upper part of the rectum a tumor of the bowel was found. It was an inch long and formed a band-like contraction of the gut, and was undoubtedly carcinomatous. No enlarged lymphatic glands were found. Above the bowel was distended and hypertrophied, and below it was contracted. After excising about three inches of the gut an attempt was made to bring the two ends of the divided gut together by means of a Murphy button. This caused considerable difficulty as the lower segment of the gut was too short. The approximation was finally completed, however, after incising the mesocolon inside. A small wick of iodoform gauze was inserted for drainage at the lower angle of the wound. The rest of the wound was sutured.

The patient did very well; there was some discharge for a few days from the lower part of the abdominal wound, but the wound soon closed. The bowels moved on the ninth day, the button was passed on the fourteenth day, and on the twenty-seventh day the patient was up and around. On May 7 the colostomy wound was closed, and three weeks later the patient was discharged from the hospital. He has steadily gained flesh and has grown stronger, and is able to attend to his ordinary duties. His bowels are regular; in fact, he has two movements every day. The patient has no pain, no discharge of mucus or blood, and is apparently cured.

Dr. Murray said that in cases of obstruction of the large intestine, where one is unable to detect the site of the obstruction, either from the clinical history or by palpation, he has resorted to a procedure which has been of great assistance in determining the approximal site of a stricture. He makes an incision in the median line in the epigastric region, an incision about two and a half inches long, and, after opening the peritoneal cavity, he draws down and inspects the transverse colon. If the transverse colon is found distended, then one may be fairly sure that the obstruction is in the descending colon or in the sigmoid. If the transverse colon is found not distended, then the obstruction is probably in the neighborhood of the cæcum. In the former case a left inguinal colostomy is indicated, in the latter case a right inguinal colostomy.

Dr. KAMMERER said he thought the suggestion made by Dr. Murray—*i.e.*, to hunt up the colon and see whether it is distended or not—was a good method of learning the site of an intestinal obstruction. In a number of such cases coming under his observation, the speaker said, he had had great difficulty in deciding where to incise the abdomen. Generally speaking, the incision should be made in the region where we suppose the constriction is located; if we have good reason to suppose that the constriction is in the sigmoid flexure, then the incision should be made on the left side; and if the constriction is on the right side, it is better to incise along the outer border of the right rectus muscle.

OLD RUPTURE OF THE QUADRICEPS EXTENSOR TENDON.

DR. GEORGE E. BREWER presented a man, fifty-eight years old, who was admitted to the Surgical Ward of the City Hospital in the autumn of 1897, suffering from an acute traumatic synovitis of the left knee. The patient was an alcoholic, constantly tearing off his splints, and otherwise unruly, and on this account he remained in the hospital for a long time.

In April, 1898, it was found that, while the effusion had been completely absorbed, the man was still unable to walk, owing to his inability to extend the leg on the thigh. Examination revealed a marked depression immediately above the patella, the latter being loose and apparently entirely disconnected from the muscular structures above. An operation being deemed necessary, a longitudinal incision was made, the centre of which was immediately over the upper border of the patella: this showed a complete rupture of the tendon just above the bone, with marked contraction of the muscle, leaving an interval of, perhaps, two and one-half or three inches. There was a rupture with practical disappearance of the anterior wall of the synovial membrane.

Two holes were drilled obliquely through the upper border of the patella, and heavy chronicized catgut sutures were passed through these and the muscle above. However, when an attempt was made to draw the divided structures together, the sutures gave way. A second attempt with stronger gut resulted in tearing out through the muscle end. Finally, a long piece of the heaviest variety of silver wire was passed through the muscle at least one inch above the ruptured end, and with a second loop nearer the divided extremity. It required considerable force to bring the divided muscle in contact with the freshened tissues at the upper border of the patella. The wound was closed without drainage and put up in plaster. No reaction followed. The dressing was left undisturbed for three weeks, when it was found that complete union had taken place. The man now has apparently perfect use of the limb.

FRACTURE OF THE PATELLA REQUIRING EXCISION OF THE KNEE.

DR. F. TILDEN BROWN presented a man who, after a fracture of the patella, eighteen years ago, recovered with ligamentous

union. Subsequent to the accident and its repair, both flexion and especially extension of the leg were somewhat limited, and the two fragments of the patella gradually became more widely separated and fixed in their abnormal positions. Two years ago the uniting band of ligament parted.

When the patient first came under Dr. Brown's observation, a radiograph of the joint showed that the two fragments of the patella were separated by an interval of five inches and firmly fixed, besides there was marked backward dislocation of the tibia. By massage and apparatus efforts were made for two months to loosen and approximate the fractured ends of the patella. No success attending this, an anterior longitudinal incision was made, exposing the adherent ends of the patella and the joint. The latter was found distended with turbid gelatinous synovia and large, hard tuberosc nodules covered the articular ends of femur and tibia. This condition of affairs showed that immediate excision of the joint was indicated.

The patient states that the leg in its present state of ankylosis is more serviceable to him than was the limb for some time previous to the secondary fracture.

In connection with this case, Dr. Brown showed X-ray pictures of the ante- and post-operative condition.

The marked backward dislocation of the tibia was due to chronic disease of the ligaments surrounding and existing in the knee-joint, together with the diseased condition of the articular surfaces. The latter presented a tuberosc-nodular condition. As the articular surfaces were separated by effusion and relaxed ligaments the attachments of the thigh muscles to the tibia probably drew this latter bone backward.

COMPLETE REMOVAL OF THE EXTERNAL EAR FOR EPITHELIOMA.

DR. BREWER presented a man, sixty-four years old, who was admitted to the Surgical Ward of the City Hospital suffering from an ulcerating new growth of the left ear. The history which the patient gave was so indefinite regarding dates that the exact duration of the disease could not be accurately ascertained. It was evident, however, that it had existed for eighteen months, or longer. A small fragment of the growth was submitted to the pathologist of the hospital, who pronounced it an epithelioma. Complete removal of the external ear was thereupon advised.

Under ether anæsthesia an incision was made completely encircling the ear, together with a second one farther back, forming an oval flap from the posterior portion of the scalp over the lower parietal and occipital regions. This was brought forward and held in place by silkworm-gut sutures, leaving only a small triangular area above, which healed by granulation. The patient made a good recovery, and has shown no signs of recurrence.

SARCOMA OF THE TESTIS.

DR. ARTHUR L. FISK presented a man, fifty-six years of age, who consulted Dr. Fisk on the 21st of October last for a large tumor of the scrotum, which had existed for eight years. The swelling consisted of a large hydrocele, with a solid tumor behind it. A needle was inserted, and after the withdrawal of twenty ounces of fluid, a solid, nodular tumor of the testis, about two and one-half inches in diameter, six inches long, and two and one-half inches wide, was made out.

On November 2, 1898, when the patient was operated on, the hydrocele, which had refilled, was again emptied, and then the diseased testis was removed. Dr. E. K. Dunham's report was, that this tumor was a small round-celled sarcoma.

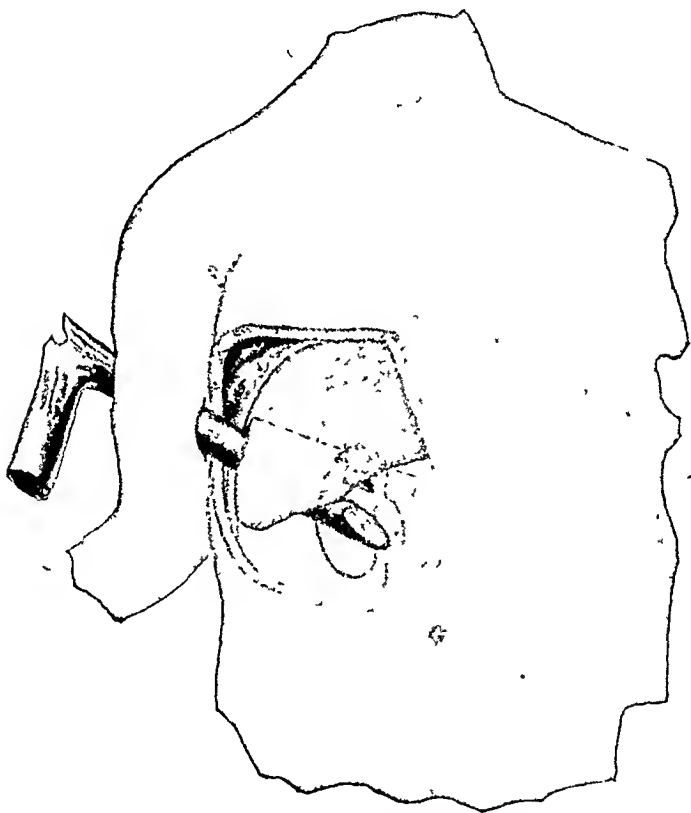
DR. ALEXANDER B. JOHNSON referred to a case of sarcoma of the testis which had developed a few months after an inguinal hernia. The sarcomatous process extended well up the cord, as far the external ring.

PERFORATING WOUND OF LIVER, KIDNEY, PLEURA, AND DIAPHRAGM; RECOVERY.

DR. ROBERT ABBE presented a man, who, on July 1, 1898, then weighing 180 pounds, while riding with moderate rapidity on a bicycle, while leaning forward to read the cyclometer attached to his wheel came into violent collision with a rapidly moving express-wagon, going in the opposite direction. As he swerved to one side to avoid it, one shaft struck his right side, and empaled him as if upon a spear. It first penetrated the right arm, separating the biceps and vessels from the humerus, and pinioning the arm to his side. Thence it crushed into the chest, breaking in the tenth rib just back of the midaxillary line, and tore through the diaphragm and liver, detaching the latter some-

what from its posterior support. The impetus of two heavy bodies moving in opposite directions now swept the pointed and worn shaft (which had by this time reached the intestinal area) in a plane backward to the spine, and making a ragged laceration through the liver, caught the kidney against the spine, and cut its upper third almost completely from the lower two-thirds.

At this stage the weight of the body broke the shaft at the



Dr. Abbe's case of lacerated wound of liver and kidney by penetrating wagon-shaft through chest and abdomen.

outer side of the arm, and as the patient fell from his wheel, the broken portion was drawn out and fell in the roadway, where the patient remembers seeing it, as he crawled away.

Some little time afterwards (the driver of the wagon having driven off and escaped) the patient was found faint and bleeding, and brought to Roosevelt Hospital, where his condition of shock precluded more than temporary surgical dressings and use of

restoratives. A large splinter of wood was removed from the arm which it transfixed.

It was seven hours before his condition was sufficiently restored to bear operative interference. By this time his temperature had begun to rise and reached 103° F.

The gravity of his wound was indicated by the fact that the urine drawn soon after entering the hospital was found to be nearly pure blood.

With every preparation at hand for speediest work the patient was etherized. A six-inch incision was made along the tenth rib, which was resected at the site of comminution, so as to give free access to the pleura, from which was sponged out clotted blood mixed with bile and perhaps urine, estimated to be about a quart in all. The lacerated wound of the diaphragm was now enlarged so as readily to admit the hand. As blood flowed freely from the torn liver, on being disturbed a temporary tampon of gauze was thrust into the rent, while an incision was made below the ribs, as if to resect the kidney, since satisfactory access to that wounded organ could only be secured from below.

Through the latter incision a careful palpation of the kidney was made, examining it with both hands, one in each incision. The upper third was torn from the lower two-thirds so that it could be moved, as on a hinge. The rent in the liver was not a hole, but a plane section, as shown in the illustration, and admitted the hand with four fingers side by side. (See figure.) The patient's condition did not warrant resection of the kidney or further operation.

Inspection of the duodenum and neighboring intestines was carefully made as laceration seemed reasonable to expect, but no intestinal contents could be seen.

Extravasated blood in the peritoneal cavity surrounding the kidney (presumably contaminated by urine and the thrust of the dirty wagon-shaft) was quickly sponged away with hot saline solution.

A tight iodoform gauze packing was then begun through the pleural wound, beginning at the kidney and continuing up through the liver, and between the liver and chest wall, where the former was torn away. This was brought up through the diaphragm and out of the chest.

A lighter tamponade, largely of plain sterile gauze, was placed in the pleura up to the retracted lung.

The lower wound was partly sutured in haste. It seemed now as if the patient could with difficulty be gotten off the operating-table alive, but by elevation of the limbs and intravenous hot saline infusion of a quart, he rallied, and passed a fair night.

The subsequent course of the case gave rise to much anxiety, and it was a month before he was out of danger. His temperature varied between 102° to 104° F. During that time the liver seemed to discharge almost all its bile, mixed with the urine from the kidney, through the wound. Then the flow of bile lessened and finally ceased.

The urine continued to discharge, for two and a half months, through the now narrowed sinus.

The lung progressively healed as in an ordinary empyema.

The patient has made an excellent convalescence since then, and has nearly regained his normal health, after six months.

DR. BRIDDON reported a somewhat similar case (the injuries being less extensive, however) which came under his observation several years ago. The patient was an Italian who had been struck by the shaft of a cart. The shaft perforated the chest wall between the third and fourth ribs, separating them for such a distance that the entire hand could be introduced between them. After pulling out the shaft, the ribs failed to resume their normal position, although they were not fractured, but simply driven out of place. The man made an uneventful recovery.

CHOLECYSTITIS.

DR. L. W. HOTCHKISS read a paper with the title, for which see page 435.

DR. HOWARD LILIENTHAL said that in trying to differentiate between a case of cholecystitis and appendicitis, careful palpation is of the greatest service, even if the belly walls are quite tense. The palpation should be made from below upward, beginning in the iliac region, and by gradually passing the hand upward one can often make out the globular feel of the gall-bladder. Dr. Lilienthal said that by this means he had made a correct diagnosis of cholecystitis in two cases, which had been turned over to the surgeons by the medical staff for operation for appendicitis.

DR. MCCOSH said that, in connection with the cases cited by Dr. Hotchkiss, where different germs were found in the gall-

bladder, he wished to refer to a case which had recently come under his observation. The patient was a man who had had fourteen attacks of gall-stone colic, and upon his admission to the hospital he had for several weeks been running a temperature which was supposed to be due to distention of the gall-bladder. About twelve ounces of thick fluid were withdrawn from the gall-bladder, and, on examining this fluid, it was found to contain typhoid bacilli, and gave a distinct Widal reaction. The future course of the case indicated that the man was suffering from typhoid fever, and that on this occasion, at least, the empyema of the gall-bladder was apparently a complication of his typhoid.

RENAL TUBERCULOSIS.

DR. F. TILDEN BROWN showed two kidneys removed for renal tuberculosis. In one the disease was not far advanced, while in the other it was very extensive: in the first, about five and one-half inches of the ureter were involved; in the other, the ureter was involved as far down as it could be followed by a very generous lumbar dissection. The diagnosis in both cases had been made by catheterizing the ureters. One of the patients was a young French woman of thirty-three years, who had been sent to him with the clinical diagnosis of renal calculus. She gave a history of repeated attacks of agonizing pain, much resembling renal colic. There was no frequency of urination, and the kidney was not painful to palpation. There was a tender point about midway along the course of the ureter, but this also existed on the opposite side. The urine from the affected side contained sodium urate and uric acid. At the operation, no renal calculus was found.

In the second case, the symptoms of renal tuberculosis were quite pronounced. The patient was passing water every fifteen or twenty minutes; in that case the ureter was greatly involved, and the bladder was much contracted.

DR. A. B. JOHNSON said he did not think that the occurrence of circumscribed tuberculosis in the kidneys, accompanied by symptoms quite characteristic of renal calculus, was very uncommon. The speaker said he recently saw two cases in which the symptoms were very characteristic of stone,—namely, attacks of renal colic and hæmaturia, and without pyuria or anything suggesting tuberculosis. In each of those cases circumscribed foci of tuberculosis were found in the kidney.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, December 5, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

EXSTROPHY OF THE BLADDER, PUBIC BONES ABSENT.

DR. DE FOREST WILLARD presented a child, five years of age, who had come under his care on account of complete absence of abdominal and anterior vesical wall, with protrusion of the posterior wall of the bladder. (Fig. 1.) This protruding membrane was deep crimson red, and bled easily upon slight traumatism. The upper margin of the area was a thin bluish-white cicatricial tissue, which cicatrix probably included the umbilicus, as no distinguishable navel was present. The urine appeared to trickle intermittently through three ureteral orifices instead of two; the third point being about one-fourth of an inch above the ordinary right orifice. A distorted, flattened, clubbed epispadic penis was attached below the lower margin of the opening. The scrotum was normal but small; both testicles had descended through the external abdominal rings, but had not reached the bottom of the scrotum.

There was a readily palpated cleft or division of the pubes, but no movement of the pelvic bones. The skiagraph (Fig. 3) shows a deficiency of the pubis fully two inches wide.

The child was otherwise perfect; of good size, well nourished, but was, of course, constantly saturated with urine.

An operation for the relief of this condition was done as follows:

An inverted U-shaped flap was cut from the abdominal wall, beginning from a little outside of the upper right angle of the opening, passing upward as high as the epigastric region,

at which point its flattened apex was cut one-fourth greater than the lateral diameter of the opening, to allow for shrinkage, thence downward, and ending at the outside of the left upper angle. This flap was made very large, so that after it was folded upon itself at its base, with skin surface inward, it might lie over the entire exposed bladder area easily, and require no tension upon the stitches to retain it in place.

A deep undercutting incision was now made around the entire lateral and lower aspects of the opening, except only the central lower portion opposite the median portion of the penis, which area was left as a urethral orifice. This incision extended through healthy skin and fat, and was one-quarter of an inch outside the red margin of the abdominal opening. Into this crevice was tucked the reverted abdominal flap with its raw surface outward.

Fine chromicized catgut stitches were inserted at numerous points, so as to bring the flap in close apposition with the marginal cut. These stitches included the fat and connective tissue of the flap, and caught the under layer of the derm, but did not extend through the epidermis, either in the reverted flap or in the skin surfaces of the abdomen in the marginal incision.

By this process both skin edges were slightly inverted, and the raw surfaces were brought absolutely into apposition, while the fat and connective tissue of the reverted flap lay in apposition, with the fat and connective tissue and skin upon the outer margin of the gaping cleft made by the circumferential incision. As a reinforcement to these sutures, a continued suture was applied secondarily, completely encircling the flap, and turning in more raw tissue in the same manner as a reinforcement stitch in intestinal work. The base of the flap being left as broad as possible, made cornua at the upper angles, which were strongly stitched.

The wide gaping wound made by turning down the flap from the upper abdomen was easily drawn together, even without much undercutting.

The raw face of the reverted flap was next covered by two lateral flaps cut from the skin and subcutaneous connective tissue in the abdominal portion of the pubis and groins, care being taken to avoid the testicles which lay outside of the external rings. These two flaps were placed with their raw surfaces inward, in apposition with the already existing raw flap surface,

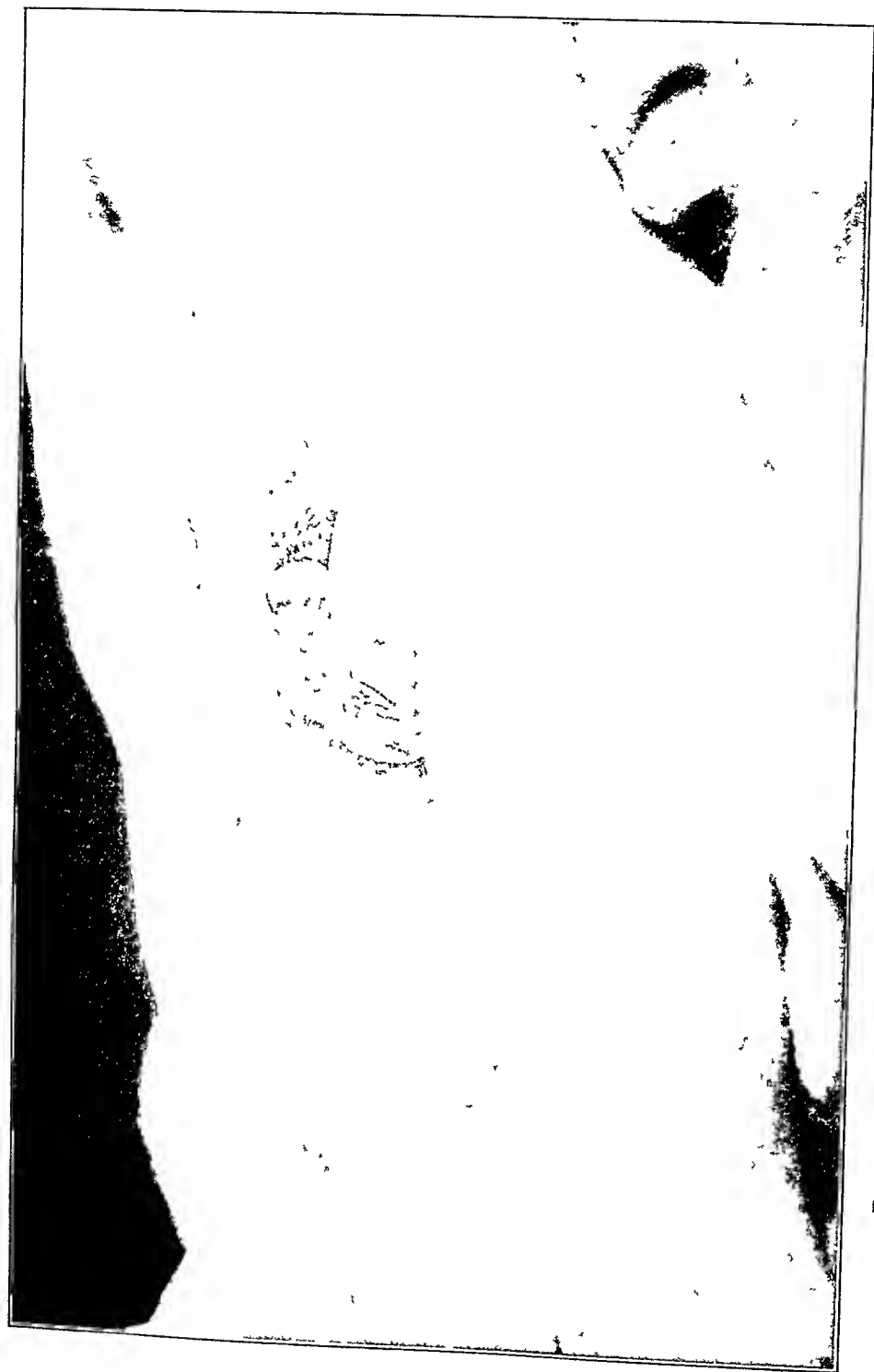


FIG 1 - Case of exstrophy of the bladder, with absence of pubic bones; condition previous to operation.



FIG 2 —Case of exstrophy of the bladder ; after plastic operation for its relief.



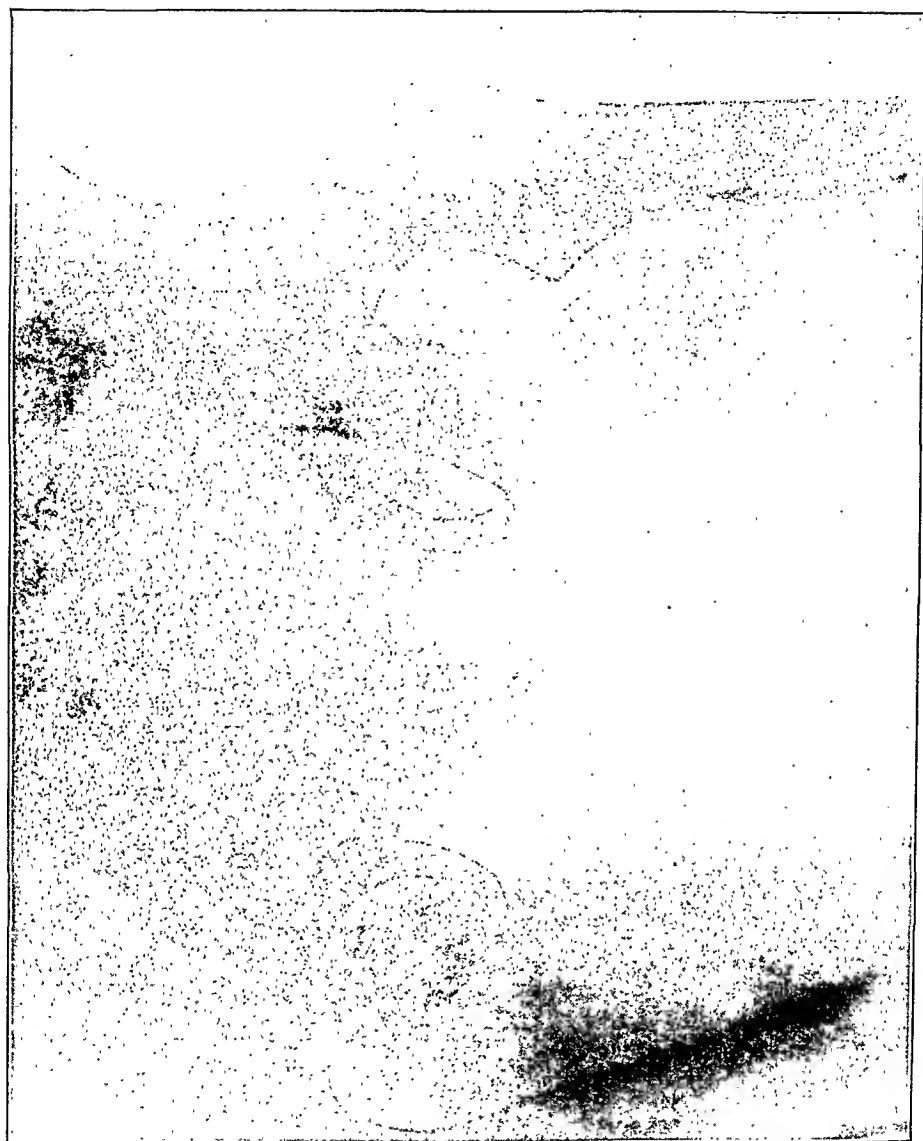


FIG. 3.—Skintograph showing separation of the pubic bones in case of exstrophy of the bladder.

and were sutured together at the median line. At their upper and outer aspects they were stitched to the abdominal skin, giving the appearance as shown in the cut. (Fig. 2.) There remained only a small opening for the escape of urine just above the distorted penis at the bottom of the original opening. Into this opening was inserted a soft drainage-tube, which lay along the groove in the upper surface of the epispadic penis.

Sterilized gauze, wet with one-eighth of 1-per-cent. solution of formalin, was kept over the wound, and renewed as often as soiled with urine.

The wounds, constantly soaked with urine, healed slowly, but at no time was there any leakage through the stitch-holes. The drainage-tube was removed after a few days. Union occurred throughout the entire area, even at points where, for the first week, gray patches threatened its safety.

At the present time the opening for exit of the urine, at the base of the penis, is narrowed to one-fourth of an inch in diameter. Further attempts will be made to construct an urethral tube along the upper surface of the penis; should this be secured, a third operation, having for its object the closure of the small aperture at the base of the penis, and the connection of the new bladder to the new urethra will be undertaken. If successful, it will bring the outlet of this reservoir at the tip of the penis.

Two attempts have already been made, but have failed. In the first one, the gutter along the dorsum was deepened by an incision, into which gutter was turned a long, slender flap of preputial skin in order to prevent readhesion. Large flaps were then raised from either side of the penis, and their raw surfaces brought together at the median line by shotted quill suture. Union failed to take place, but the preputial flap, turned in to prevent the reunion of the sides of the deepened gutter, lived.

Two months later another plan was adopted: two longitudinal surfaces, each one-fourth of an inch in width, were denuded along the dorsum of the penis, leaving a central strip of skin tissue in the centre as an urethral floor. Across these raw surfaces was then turned a large flap, cut from the prepuce and lateral skin of the penis, and stitched with its raw face inward along the edges of the bared area. As this distance was less than one-half inch in length, the stitches could be inserted on

both sides. This also failed, but a third attempt will be made as soon as the condition of the tissues will permit.

It is wise never to sacrifice the prepuce until the completion of all operative procedures for this difficulty, since it is often most useful in supplying needed tissue. After final success is attained, the prepuce may be pruned as desirable for cosmetic purposes. The natural tendency of the flattened clubbed penis to assume its original condition makes too much tension upon the flaps if any attempt is made to draw its sides together.

A few words in relation to the question of the formation of a urinary receptacle, or an artificial bladder. Necessarily such a constructed bladder does not yield the results of a muscular contractile organ, and it seems hardly possible that a contractile cavity can be secured. The object of the procedure is rather to secure a receptacle in which the urine may be temporarily stored, from which it can be drained through a narrow orifice into a rubber vessel to be worn constantly upon the person. The special variety of urinal is a question of mechanical adaptation. The skin in such a constructed bladder retains its hair-bulbs, and in cases where capillary growth occurs, it becomes the centre of deposit for urinary salts. Many attempts have been made to secure another route for the ureters, principally transplantation into the rectum or perineum. The latter point, however, does not offer a much more favorable area for the adaptation of a urinal than does the abdomen, save as gravity assists.

The operative closure of the bony pubic cleft, either by the separation of the sacro-iliac articulation, as advised by Trendelenburg, with direct suturing and closure of the soft parts, does not fulfil the indications, and the wounds are specially liable to infection from constant saturation of urine. A new bladder constructed only from the posterior wall surface would be an exceedingly small one. The risks of infection would not seem much greater if the existing posterior wall mucous membrane were dissected free from its circumference, and its freed edges united to form a pouch, without disturbance of the bony structures. Should the peritoneal cavity be opened by this procedure at the thin margin, it could be sutured. The strength of the anterior wall could be fortified by turning in lateral flaps, raw surfaces inward.

The operation of König—osteotomy of the pubic rami—is

open to the same objection of wound infection as is that of sacro-iliac section. The sides of the pelvis, after either of these operations, must necessarily be brought together with considerable force, and the resultant injury to the pelvis in a female would be unjustifiable.

Transplantation of the ureters has for many years been a favorite procedure, the rectum being naturally the receptacle adopted, as the vagina offers but little power of retention. Many experimenters have proved that the rectum resents the urine, but the chief ultimate danger is the infection of the kidneys through the ureters. Recently attempts have been made to improve the technique of the operation, in order to prevent this most serious result. Maydl, Fowler, and others have succeeded to a moderate degree, but many years must elapse before the success of the procedure can be determined. Maydl's plan, which endeavors to retain nature's method of vesical valve-opening of the ureters, consists in transplanting the whole *bas fond*, together with its ureters, into the rectum bodily.

Other operations, as that of Bignoni, aim to provide a V-shaped valve cut from the anterior wall of the bowel, so that the orifices may be covered by little folds. Fowler very properly criticises Maydl's operation by calling attention to the fact that the conditions in the rectum, even after union is secured, are entirely different from the water-pressure valve as exerted in the bladder upon the lower ends of the ureters. Pisani's operation, of carrying the ureters across the calibre of the rectum and inserting them into the posterior wall, seems to offer no advantage, but, on the contrary, many defects.

Fowler (*American Journal of the Medical Sciences*, March, 1898) has proposed an ingenious method, but whether it will be practicable remains to be determined by experience. With the patient in the Trendelenburg position, he opened the abdomen, secured the ureters at their entrance into the bladder wall, and cut them off obliquely. A longitudinal incision was then made into the anterior wall of the rectum, through serous and muscular coats only; these layers being dissected aside, and retracted by stitches, a diamond-shaped area of submucous tissue was exposed. A tongue-shaped flap, base upward, was then cut through the mucous membrane, opening the calibre of the rectum, which had been previously cleansed. This tongue-flap was then

doubled upon itself so that one-half of its mucous surface presented anteriorly, in which position it was secured by catgut sutures, thus securing a flap-valve covered on both sides with mucous membrane. The ureters were then stitched in the incision with the obliquely cut ends lying upon the presenting mucous membrane surface of the flap, care being taken not to invade the lumen of the ureters with the catgut stitches. The flap-valve, together with the attached ureters, was then pushed into the cavity of the rectum, the wound being closed in such manner as to maintain this flap free within the bowel. The ureters in this closure were made to pass obliquely for a considerable distance in the wall of the bowel, so that the subsequent muscular constriction of the tube would assist in the prevention of infection.

This operation was done more than two years ago, with the result that the rectum would retain the urine for three hours or longer, and that urination and defecation took place independently, the latter occurring only once daily, a fact that would seem to indicate that the sigmoid flexure, or the upper portion of the rectum, as has been otherwise observed, is the ordinary receptacle of fæces. The child, at the time of the report, had not shown evidences of renal disturbance, but the period is too short to determine definite results.

The boy presented for examination by Dr. Willard showed a firm abdominal cicatrix, with a bladder capable of containing several ounces of urine, but there was no control of the flow from the basal opening, save as the stunted penis acted as a sort of valve. Should further attempts at construction of a urethra fail, the application of a truss or pad to this distorted penis might possibly be effectual in converting it into a pad or cork that would close the small existing opening, and permit the boy to empty his bladder at stated intervals, and thus be saved from the misery of constant dribbling.

As he will be entirely incapable of procreation, the question of castration will be considered later, as an element in the prevention of the moral degradation which so often characterizes this class of cases.

CLOSURE OF PERFORATING TYPHOID ULCER.

DR. DE FOREST WILLARD reported the following case:

A Massachusetts soldier was admitted to the Presbyterian Hospital October 30, 1898, under the care of Dr. Musser, with a history of sickness of five days' duration, accompanied by nose-bleed, etc. Temperature 104° F. Frequent baths were given, reducing the temperature to 99° , with variations, the highest point attained being $104\frac{3}{5}^{\circ}$. Marked distention of abdomen by tympany developed. On the thirteenth day a small hæmorrhage from the bowels occurred, followed by depression of temperature to 99° . On the fifteenth day, at 11 A.M., sharp pain to the right of umbilicus was complained of, followed by rapid weakening of heart-power, dyspnœa, cold sweat, etc. Two hours later the pain in the abdomen was of moderate degree, but persistent. Muscles resistive rather than rigid; this resistance slightly in excess on the right half of abdomen; had vomited once, and was retching occasionally; had just passed a small amount of thin yellow fæces, *without blood*. The abdomen was moderately distended and tympanitic; line of resonance between liver and diaphragm. Temperature 98° , pulse 150, small, feeble, and thready. Voice also feeble.

The question of diagnosis between fresh hæmorrhage and perforation seemed to favor the latter hypothesis. Pain, depression, etc., might follow either accident, but the absence of any blood in the stool, two and one-half hours after the onset, together with the presence of resonance above the liver, were in favor of perforation.

Immediate operation was advised, but during the removal of the man to the operating-room, and the preparation incident thereto, most marked failure in heart volume and in respiration were apparent, and when the operation was commenced the patient was almost *in extremis*. An attempt to save his life, however, seemed justifiable. A rapid incision was made along the right semilunar line. A large amount of greenish-yellow, ill-smelling serum and fæces flowed through the wound. The deeply congested ileum was drawn out, and followed downward towards the right iliac fossa, the most probable point of perforation. Several thin ulcerated portions were passed, but in a few seconds a point four inches above the ileo-cæcal valve was reached from

an opening in which, of size just sufficient to admit a grooved director, oozed yellowish faecal contents. About this area already were indications of lymph exudation.

Interrupted Lembert silk sutures were introduced, inverting longitudinally the perforation. The extreme thinness of the intestinal walls, with the irregular induration, showed a large ulceration.

A secondary, fortifying, continuous suture was inserted. No other perforations existing above the ileo-cæcal valve, the abdomen was thoroughly flushed with large amounts of hot sterilized water, which, together with the use of oxygen, assisted in partially reviving the patient.

His condition had been throughout the operation most desperate, necessitating rapid work, and absolutely prohibiting the question of evisceration and dry sponging of lymph. A large glass drainage-tube was inserted, and the wound closed. Patient was kept alive by the administration of oxygen, but he died almost immediately after the completion of the dressings. The attempt to save him and the prompt securing of the perforation, within a few minutes after making the incision, rendered the proceeding, however, thoroughly justifiable, although the rapid collapse previous to the operation indicated a positive and speedy death.

The subsequent examination showed that the point had been firmly closed, and had the patient's condition been more favorable, might readily have resulted in saving his life. The intestine showed numerous points of deep ulceration; at the point of perforation a large, ragged, deeply excavated ulceration existed, of irregular shape, at least an inch in diameter. The appendix was normal.

DR. J. EWING MEARS said that, ten years since, he read a paper at a meeting of the American Surgical Association in Washington, in which, so far as he was able, he collated the number of cases in which cœliotomy had been performed for perforating typhoid ulcer. The cases were four in number, and, in chronological order, were those of Professor Kussmaul, of Strasburg, Mr. T. H. Bartleet, of Birmingham, England, Dr. R. B. Bontecou, of Troy, N. Y., and Dr. T. G. Morton, of Philadelphia. All of these cases were fatal. The conclusions presented in the paper were as follows: First, surgical interference should not be instituted in cases of typhoid fever, in which perforation occurs

when the infective process is at its height. Second, in mild cases of the disease, in which the pyrexia has not been of high grade, and in which perforation occurs at the end of three weeks or later, when the stage of convalescence is fully pronounced, cœliotomy may be performed. Surgical interference, in cases of this character, is advocated with the hope that, if the method suggested by Lucke—cœliotomy with the formation of an artificial anus—be adhered to, success may be accomplished. Third, rapidity in operation would be an essential factor in the achievement of success, through which prolonged exposure of the cavity will be avoided and shock greatly lessened. The perforations having been closed or an artificial anus having been formed, hot antiseptic solutions should be poured in sufficient quantity into the cavity, a glass drainage-tube carried to the floor of the pelvic cavity, and the wound closed. Prolonged "toilet" of the peritoneal cavity, as is generally understood, should not be made while the cavity is opened. Irrigation through the drainage-tube should be made as soon as the cavity is closed, and should be repeated at such intervals as the surgeon may deem proper. Should the patient survive, relief from the artificial anus can be obtained by operation.

DR. WILLIAM J. TAYLOR remarked that in Dr. W. W. Keen's book, on the "Surgical Complications and Sequelæ of Typhoid Fever," there are a number of cases recorded of recoveries after operations. All of these were operated upon within twenty-six hours after the perforation was supposed to have occurred, and nearly all were operated upon within a few hours. No cases recovered that were operated on later than twenty-six hours.

DR. WILLARD said that, of course, the number of recoveries in operative cases following perforation must necessarily be small, because the condition before the operation is generally a desperate one, and most cases are seen when *in extremis*. If the operation is performed within twenty-four hours the percentage of cures will be increased; after twenty-four hours interference seems almost hopeless. This man was operated on between five and six hours after the perforation, and he was dying at the time,—it was only a desperate attempt to save him.

As to the length of time required to find the perforation he made the right lateral incision purposely, so that he could reach

the point of perforation in the quickest possible time. He did not think it was more than two or three minutes after the abdomen was opened before the perforation was found. He struck the ileum about twelve inches above the ileo-cæcal valve, and the perforation was four inches above. He only had eight inches of the ileum to run over, stopping to investigate two or three points of ulceration before this perforation was found. The sutures were inserted and the perforation closed as quickly as possible.

In regard to flushing or the toilet of the abdomen, the time consumed would be just about the same in suturing, or excision, or the formation of an artificial anus, so that the question of time would not enter very seriously as regards to the method.

As to the question of excision of the ulcer. The man was in a desperate condition, as are nearly all these cases. In this case the intestinal wall was exceedingly thin, and in placing the stitches he felt that he was going as closely to the ulcerated mucous membrane as it was possible, and yet only one stitch out of seven or eight interrupted sutures tore out or had to be reinserted. He whipped a continuous suture outside of the first row to roll in more of the bowel and invert this ulcer still farther into the lumen. After the operation all of them were found to be firmly placed, as is shown in the specimens, the ulceration itself dipped there far into the lumen of the bowel.

PENETRATING WOUNDS OF THE THORAX.

DR. ROBERT N. DOWNS, JR., presented a man, thirty-nine years of age, who, on the evening of October 18, 1898, was brought to the Pennsylvania Hospital, suffering with three stab-wounds of the chest, all on the left side. The upper one was situated in the posterior axillary line, in the eighth interspace, on a level with the nipple. The direction of the thrust was apparently directly inward, as the finger carried in revealed wounded pleura and lung tissue at the same level. The lower wound, from which a piece of omentum was protruding, was located in the ninth interspace and midaxillary line, two inches to the right and six inches below the upper wound.

In addition, there was present a non-penetrating wound, one inch below and behind the upper.

The man was quite shocked on admission. Temperature, 96° F.; pulse, soft and rapid; countenance pale and surface

sweaty. There was, however, but slight external oozing from the wounds, although each respiratory effort was accompanied by rushing of air in and out through the openings.

The abdomen was distended, tense, and dull, especially in the flanks. Dr. R. G. Le Conte saw the case almost immediately, and decided upon operation. The patient was etherized, and an incision made in the median line of the abdomen, above the umbilicus. Upon opening the peritoneum a large quantity of blood, liquid and clotted, escaped. A small portion of bleeding omentum was ligated and excised, and the abdominal cavity flushed out, rapidly filling, however, with blood.

Search for the source of hæmorrhage now revealed a rent of considerable extent in the left segment of the diaphragm, through which the blood was escaping from the thoracic into the abdominal cavity. At this point the patient's condition became so alarming that three quarts of salt solution were quickly transfused into the median basilic vein, and the abdominal incision was closed. An attempt was now made to insert gauze packing into the lower chest wound with hope of controlling bleeding. This was followed by free hæmorrhage through packing and at the same time expectoration of frothy blood, the pack was withdrawn and a fenestrated rubber drainage-tube was then inserted at the upper and brought out at the lower wound where it was secured. Atmospheric air was now rushing into the pleural cavity with each inspiration, and at the same time a large quantity of blood was escaping through the tube. A large antiseptic dressing was now applied and the patient was put to bed. His condition after operation, though precarious, was even better than on admission. Eight hours after operation, though the primary dressing was saturated with blood and some oozing still persisted, his condition was fair. Pulse rapid but of good volume and temperature 100° F. No further hæmoptysis occurred, but some dyspnœa was experienced.

The drainage-tube was removed on the third day after operation, the hæmorrhagic oozing having almost ceased. In the mean time he had steadily improved. Free bowel movement had been secured, and no symptoms of peritonitis had developed.

From this time on, with the exception of a mild purulent pleurisy, developed ten days after operation, accompanied by rise

of temperature and free discharge from chest wounds, his convalescence was unnoteworthy.

Examination of the chest, at the time of presentation, revealed a dulness on percussion over base of left chest behind, less marked when patient turned on his side, accompanied by diminished tactile fremitus and distant breath-sounds.

Dr. Downs also presented a second patient, a colored man, thirty-five years of age, who, on the same day that the first case was admitted, was brought into the receiving ward, suffering with a penetrating stab-wound of the chest, inflicted with a pocket-knife. The blade had severed the costal cartilage of the fourth rib, on the right side, about three-fourths of an inch to the right of its sternal attachment, passing thence into the pleural cavity. The section made by the weapon in passing through the cartilage was complete, and transverse in direction, quite similar in appearance to the wound caused by the costotome when removing a sternum during post-mortem examination.

There existed in addition a punctured wound in the deltoid region of the left arm.

When seen, shortly after admission, the patient was in a condition of collapse. Countenance pale and voice husky. Pulse weak and rapid, extremities pinched and cold, with sub-normal temperature; and in addition, considerable nausea and vomiting. There was, however, no hæmoptysis, and but slight external oozing from the chest wound. On physical examination, as in the first case, atmospheric air could be heard passing into chest with each respiratory effort, and blood also could be seen welling up. The right side, especially on the posterior aspect, was very dull on percussion, with absent breath-sounds. When seen by the chief of the service, Dr. T. G. Morton, his condition was such that any operative procedure was deemed inadvisable. The patient was accordingly placed in the ward, having made his ante-mortem statement before a magistrate, and treated with free stimulation and opium in moderation. His external wounds were closed with catgut and dressed with sterilized gauze.

Twenty-four hours after admission his voice had become more natural, his pulse was comparatively faint but of good volume, temperature slightly elevated, extremities warm and not shrivelled at tips. No further nausea and no external oozing. He complained of soreness in his chest and difficulty in breathing.

In the succeeding forty-eight hours the dyspnoea disappeared, and the patient's general condition was much improved.

He was permitted to be out of bed thirteen days after admission, at which time, though feeling fairly well, the percussion dulness still persisted on the right side, less marked, however, on the anterior aspect. He was discharged from the hospital on the 21st of November.

Physical examination at the present time reveals a dull percussion-note over right posterior chest, amounting to flatness at the base, accompanied by greatly diminished tactile fremitus and weak breath-sounds, which at the base are inaudible.

DR. ROBERT LE CONTE remarked that when a knife or any other sharp instrument penetrates the pleura and wounds the lung, the hæmorrhage is generally profuse, and frequently alarming. The bleeding may take place from the lung, from an intercostal or internal mammary artery, or from both. He had never been able to demonstrate that the intercostal artery was cut. He had never seen it spurt, and he should infer from its protection by the lower border of the rib that it is not often injured, unless the rib also shows marks of violence. The small branch that runs along the upper border of the rib is too insignificant to be of much consequence. That great and alarming hæmorrhage can take place from the lung is well illustrated in a case reported by Dr. J. Chalmers Da Costa a year ago before this society. To be sure, in that case the hæmorrhage was a secondary one; but if it can occur as a secondary result, why not also as a primary one. Hæmorrhage from the lung, as seen by him, is characterized by very dark, almost black, blood. This must be due to a wounding of the branches of the pulmonary artery, the darkest blood in the body, and the escape of the blood before it has a chance to be acted upon by the air. If, however, the blood has collected in the pleura, and been exposed to the air for a short time on account of a pneumothorax, it will be considerably lighter in color. Also, as seen on the dressings, it will present a normal hue, but as it comes from the lung it is darker than ordinary venous blood. Hæmoptysis may or may not be present. In the few cases he had seen it had been absent certainly half the time. When present, the blood is bright in color, as it has had a chance to be well aërated on its passage through the bronchi.

If there is profuse bleeding from a penetrating stab-wound of the chest, and no indications that an intercostal artery has been severed, and the locality of the wound eliminates injury of the internal mammary, one must infer that the hæmorrhage is from the lung itself. In dealing with it some advise the immediate closure of the external wound by suture or a plug of gauze, others the insertion of a drainage-tube with free drainage, and some text-books give both procedures, but do not state why you should use one in preference to the other.

When plugging or immediate suture of the external wound is resorted to, strapping of the chest is also recommended, with the application of cold and the administration of drugs, like ergot, sulphuric acid, etc. The object of closing the wound is to dam up the blood in the pleural cavity, and so, by its mechanical pressure on the lung, stop the hæmorrhage. That many cases have recovered under this line of procedure is well known; but does the hæmorrhage cease on account of this intrapleural pressure? He would answer no. In the first place, the pressure in a lung on forced inspiration is equivalent to about thirty millimetres of mercury, and at expiration its pressure is a negative one of from six to ten millimetres of mercury,—in other words, the tendency for the elastic tissue of the lung to still further contract at expiration is equivalent to from six to ten millimetres of mercury. By strapping the chest one endeavors to prevent the respiratory muscles from acting and to keep the lung in a position of expiration, one in which the intrapleural pressure is negative instead of positive. To be sure, the capacity of the chest is diminished, but it will still be large enough to hold a quart or two of blood before any very considerable pressure will be exerted on the lung. Secondly, when blood is poured into the pleura and the air is excluded, there is little or no tendency for it to clot, and it frequently remains fluid for days or even weeks. Therefore the chances of the cut vessels closing by clot are materially decreased. Thirdly, as the mechanical pressure from the effused blood increases and forces the lung back against its root, it must materially affect the circulation of blood through the lung, and so engorge the right side of the heart and raise the blood-pressure. Therefore, as the mechanical pressure increases the blood-pressure rises also, and, the severed vessels remaining patulous, the gain from the outside pressure is in a measure over-

come by the increased pressure within the vessels. He said in a measure, for the loss of blood would tend to decrease the blood-pressure. By the application of ice to the chest only a very slight effect can be exerted on the lung, and the exhibition of drugs he believed to be useless, and of ergot to be rather harmful. Now when such a case recovers, he does so with a pleura filled with blood. If the blood remains fluid it may be easily aspirated and no harm result. But if clotting takes place before aspiration is tried, a rather formidable operation would be required to remove the clots, and if they are allowed to remain, organization will take place, the pleural cavity will be obliterated, and the lung tightly glued to the chest wall: a condition which certainly impairs the usefulness of the organ and renders it more vulnerable to disease.

In a case in which a bronchus has been opened in addition to a severing of the vessels of the lung, and in which the external wound has been sealed, the hæmorrhage will be much more rapidly controlled, owing to the mechanical pressure of the pneumothorax on the lung, and the blood will readily clot in the presence of the air; an ideal condition for the rapid control of hæmorrhage. But the patient is subjected to the risk of having this mass of blood-clot infected through the opened bronchus, and changing a hæmothorax into a pyothorax. This risk is a very serious one, and one not to be incurred with the hope and a prayer that infection will not take place. Also by closing the external wound the chances of a general emphysema taking place are vastly increased, a complication which is annoying and may be serious.

In cases where a drainage-tube is inserted into the pleural cavity and free drainage established, the pleura is immediately filled with air, and the muscles of respiration are prevented from acting on the lung, allowing the lung to contract by its own elastic tissue as well as by the pressure exerted by the pneumothorax, and at the same time the presence of the air favors clotting in the severed vessels. In his limited experience this simple procedure had been quite sufficient to stop the hæmorrhage. In addition, the drainage has cleared the pleura of blood, and if any infecting material has been carried in, it has reduced its dangers to the minimum. It has been objected that the drainage-tube is itself a menace to the sterility of the wound, but in these

days of asepsis the dangers of infection from this source are very slight. However, if it does occur, it will be limited to the immediate neighborhood of the wound, and cannot be a complication of much seriousness. Another objection, and one of more weight, is the danger from a large and rapidly formed pneumothorax. Quénu, of Paris, experimented on a dozen dogs to find out just what the dangers are in a quickly formed pneumothorax. He states that when a healthy pleura (one without adhesions) is freely opened, the symptoms of heart-failure will be rapid, labored breathings were always present and very alarming, and in one or two instances were sufficient to cause the death of the dog. If the animal did not die, the dangerous symptoms slowly disappeared. Death was undoubtedly due to the sudden engorgement of the right side of the heart, and the dog lost his life because he was strong and full-blooded, and the sudden rise in blood-pressure was sufficient to overcome the heart. Would this objection seriously apply in a man who has lost much blood? He thought not, but if it did, it could readily be controlled by venesection. Further, he could conceive of its being of positive benefit, where the hæmorrhage has been very great and the blood-pressure reduced to its lowest ebb, as a quick and ready means of raising the pressure and tiding the case over until salt solution can be injected into a vein.

If drainage and the admission of air to the pleural sac does not control the hæmorrhage as a last resort, the wound in the lung must be packed or sutured, or the bleeding vessels ligated. This will require the resection of one or more ribs, as a lung cannot be packed unless grasped and held.

Referring to the first case reported by Dr. Downs, his condition was very serious, and he showed the effects of having had great hæmorrhage, yet but little blood was coming from the chest wounds. The lower wound was plugged with omentum, and the blood from the lung was pouring into the abdominal cavity through the cut diaphragm. While searching the abdominal organs for an injury, his pulse rapidly failed, and not finding anything to account for the hæmorrhage, the abdomen was quickly closed and the lung wounds investigated. The hæmorrhage now was very profuse from the pleural cavity, and he was strongly tempted to resect one or two ribs and pack or suture the lung to control it, but he felt death must follow any pro-

longing of the operation, and that the man's best chances of recovery lay in drainage.

DR. DE FOREST WILLARD said that the objections that Dr. Le Conte had urged in regard to closure of the external wound in these cases were certainly valid. Simple closure of the external wound in order to arrest a hæmorrhage, which is separated a considerable distance from this wound, across the pleural cavity which will contain a quart of fluid, certainly does seem a very uncertain procedure. He had, however, been largely influenced against the method of free opening of the chest by a series of experiments which he undertook some years ago on dogs for pneumotomy and pneumectomy, and opening the bronchus for foreign bodies, etc., by the alarming and tremendous collapse of the dog that took place, whenever a free opening was made in the chest. The dyspnœa and the signs of impending death were regulated almost in exact proportion to the size of the opening. If the wound was closed absolutely, the dog began to breathe much easier, would recover again, and the operation could be proceeded with. If partially closed, and the opening was small, the dog improved; if it was left large, he was very apt to die and die speedily. It seemed that the size of the opening increased the amount of pressure upon the lung, interfered with the circulation through the pulmonary arteries and veins, and produced collapse. From these experiments he was led to the conviction that the safest plan was that of closure of the external wound, so far as the immediate results were concerned. In many of these cases, if the hæmorrhage is large, it is the immediate death that is to be averted. The secondary results, hæmothorax and pyothorax, must be met later by surgical measures; opening the chest, then, can be done with safety, as in a case of empyema. As noted in the late war, even perforating wounds of the lung—a very considerable number of them—recovered when no operative interference was instituted and when the wounds were simply closed. The thorax seems to be a cavity which bears blood fairly well. The hæmorrhage frequently does cease under this method of closure, and while the objections are valid, yet in practice the weight of testimony is in favor of the method of closure of the external wound.

DR. J. CHALMERS DA COSTA said that he had been very much struck with the argument that Dr. Le Conte had made

in favor of incision with the introduction of the drainage-tube. The views which he has reached as to the effect of intrapleural pressure are also the views which have been maintained with considerable force by Pagenstecher. A number of cases of wound of the lung have been scientifically studied of late, but there have not been enough cases to emphasize very clearly which treatment we should follow, closure or incision and drainage. It is certain that a number of cases have recovered under both plans of treatment. Surgeons will not be able to determine these points until the records of a large number of cases can be brought together, records in which the general condition has been accurately outlined, and in which the subsequent treatment has been carefully pointed out. We need something in the nature of a collective investigation.

The problem, when should one attempt to suture a lung, is involved in still more obscurity. In the French Congress of Surgeons there was recently a debate upon this question, and great differences of opinion were noted. When one sees a man who seems certain to die without interference, a man in whom the line of hæmorrhage is rapidly rising, and in whom the symptoms of shock are rapidly increasing, he believed that, in spite of the peril which there may be in opening the chest, the common rule of surgery should be applied, an incision should be made, one or two ribs should be resected, and the hæmorrhage should be arrested. He could imagine no more serious harm that could come to a patient than to simply leave this hæmorrhage in the charge of nature.

In some cases bleeding may be arrested by ligature, in others by suture, in others by packing with gauze, in others by fixing the lung with gauze packing, as applying a gauze compress against the bleeding point.

DR. LE CONTE remarked that in his remarks he had in mind only severe hæmorrhage. He did not refer to small punctured wounds of the lung or wounds where the bleeding was not excessive, but to those cases where the hæmorrhage was large, where it was an immediate threat to the patient's life if not stopped. Unless resection of some ribs with packing or suturing of the wounded lung is resorted to, it seemed to him that the first object should be to get pressure on that lung. Air will do this as well as blood in the pleura: it will do it instantly in-

stead of waiting until a sufficient amount of blood has been poured out: it will permit the vessels to close by clots, while the other prevents it: and it will save to the patient the amount of blood necessary to exert mechanical pressure. These are the immediate benefits, and the remote ones are that there are eliminated the dangers of a pyothorax or of universal adhesions of the pleura. The danger of engorgement of the right side of the heart must be slight where the patient has lost much blood. Because it is great in a full-blooded dog is no reason why it should be so in an exsanguine man. The conditions are different, and the cases are not parallel.

EDITORIAL ARTICLE.

THE TREATMENT OF TETANUS BY MEANS OF INTRACEREBRAL INJECTIONS OF ANTITOXIN.

- I. THE TREATMENT OF TETANUS BY MEANS OF INTRACEREBRAL INJECTIONS OF ANTITOXIN. By GEORGE G. RAMBAUD (New York). *New York Medical Journal*, December 17, 1898.
- II. TETANUS: TREATMENT BY TREPHINING AND THE INTRACEREBRAL INJECTION OF ANTITETANIC SERUM. By CHARLES A. CHURCH, M.D. (Passaic). *New York Medical Journal*, December 17, 1898.
- III. UN CAS DE TETANOS TRAITÉ PAR L'INJECTION INTRACEREBRALE D'ANTITOXINE, par M. le DR. E. FORGUE professeur à la Faculté de Montpellier. *Bulletins et Mémoires de la Société de Chirurgie de Paris*, Tome xxiv, No. 37, p. 1128.
- IV. THE TREATMENT OF TETANUS BY THE INTRACEREBRAL INJECTION OF ANTITOXIN. By D. SEMPLE, M.D. (Netley). *British Medical Journal*, January 7, 1899.

I. The author quotes the conclusions of Roux and Borrel, from experiments at the Paris Pasteur Institute, that the tetanic toxine is extracted from the blood and fixed by the nerve-cells, while the tetanic antitoxin, when injected into animals, remains in the blood, so that the antidote does not come in contact with the poison, and the two substances, though so near each other, fail to meet. This explains why, in man as well as in animals, the subcutaneous and intravenous injections so often fail, for

when they are resorted to the nervous system has already fixed a smaller or greater quantity of the toxine, and while the antitoxin, thus administered, neutralizes the toxine circulating in the blood and limits the poisoning, it does not reach that which is attached to the cerebral or spinal cells. When the intoxication has advanced thus far, the toxine diffuses itself from one nerve-cell to the next, protected from the antidote, and the disease runs its course. Hence the proposition to place the antitoxin where the toxine is acting, that is to make intracerebral injections of the antitoxin. Of forty-five tetanized guinea-pigs, treated with intracerebral injections, thirty-five recovered; of seventeen others treated with simple subcutaneous injections, only two survived; of seventeen not treated with antitoxin at all, all died.

The theory is that the antitoxin introduced into the brain protects the upper part of the cord, even though the lower portion is already affected by the poison, but it does not cure the lesions that have already taken place, the contractions existing at the time of intervention persisting for some time, and, if the medulla is already poisoned (as shown by impaired deglutition and possibly respiratory disturbances) death cannot be prevented.

In man the intracerebral injection is made into a neutral area, such as the forepart of the frontal lobes, after the removal of a small button of bone by a trephine; the quantity of the serum injected is small (five to six cubic centimetres of a concentrated serum made by drying ten parts and then redissolving in five parts), and by its slow introduction any undue compression is avoided.

In addition to the intracerebral injection it is necessary to continue to give antitoxin intravenously or subcutaneously for a few days, so that thereby the toxine circulating in the blood and any that may later be secreted at the site of injury may be neutralized before it can affect the nervous centres.

Rambaud gives a *résumé*, collated from French periodicals, of nine cases thus treated, four of which recovered and five died.

In all the fatal cases the course of the disease was extremely rapid and severe; in three of the five the death occurred within fifteen hours following the operation,—that is, before the serum could have had time to take effect. Reference is also made to three American cases, one of which died twelve hours after the injection without relief; one was relieved of tetanic symptoms, but died eleven days after the total disappearance of tetanic manifestations from a coincident nephritis. The third case made a perfect recovery.

II. This case is reported in full in the same issue of the *New York Medical Journal*, by Dr. Charles A. Church, of Passaic, N. J., under whose care the treatment was conducted. A man, twenty-seven years of age, twelve days after having sustained an extensive lacerated wound of the calf of one of his legs, developed symptoms of tetanus. For six days the case was allowed to progress without specific treatment. On the seventh day, general tonic spasms having become frequent and pulse rapid and weak, two subcutaneous injections of antitoxin (each of twenty-five cubic centimetres of Gibier's antitetanic serum) were administered, with an interval of eight hours. Some immediate amelioration of his symptoms followed these injections, but by the next day he was worse than ever. Then the frontal bone was pierced by a trephine, a quarter of an inch in diameter, at a point four centimetres above the frontal eminence and four centimetres from the median line, a location corresponding to the site of the second or middle convolution of the frontal lobe; through this opening a long, fine hypodermic needle, attached to the syringe containing the specially prepared serum, was pushed into the frontal lobe of the cerebrum at right angles to the surface of the skull, at that point to the depth of between two and two and one-third inches, and about sixty minims of the serum were then slowly injected, drop by drop, taking from ten to twelve minutes for the process. After dressing the wound, the same operation was repeated on the opposite side. While the patient was still under the anæ-

thetic, twenty-five cubic centimetres of the antitetanic serum were injected intravenously, and the same amount of antistreptococcic serum was given subcutaneously. During the day of this operation the spasms persisted with undiminished frequency. Upon the day following three injections of serum, twenty-five cubic centimetres each, were given at intervals of eight hours; after which the spasms became less severe. By the fourth day after the operation the improvement had become decided; meanwhile twice daily intravenous injections of twenty-five cubic centimetres of the antitetanic serum were being made. Later these injections were made only once daily until at the end of eighteen days the spasms ceased entirely. In all about 375 cubic centimetres of serum were injected. Chloral and morphine were also freely used in the course of the treatment. (It is quite evident that this Passaic case by itself is quite inconclusive as to the value of the intracerebral injections, on account of the free and prolonged use of the intravenous injections and the simultaneous use of chloral. That the tendency of the case was to chronicity from the first is evident from the fact that not until the seventh day of the symptoms did the condition of the patient become such as to suggest to the attendants the necessity of other than homœopathic treatment.—*Reporter.*)—*New York Medical Journal*, December 17, 1898.

III. Dr. E. Forgue, of Montpellier, reported to the Society of Surgery of Paris, at its meeting of December 14, 1898, the following case: A farmer, thirty-two years of age, while at work injured his left great toe with a tool with which he was working. After resting for six or seven days, he resumed his work and continued to work until the thirty-third day after the accident, when he began to feel pain in the left leg. On the next day some stiffness of the muscles of the back of the neck and of the jaw developed. By the third day the trismus had become well marked, and the usual treatment for tetanus was instituted,—chloral, bromide, and morphine. After three days of this treatment, his

condition remaining about the same, the administration of anti-tetanic serum was begun,—viz., on the sixth day of the developed disease. Thirty cubic centimetres of the serum were injected, in three doses of ten cubic centimetres each. On the following two days the same amount was injected each day, without any beneficial result. By the ninth day of the disease the condition of the patient had become apparently hopeless; opisthotonos was present; the convulsive crises were frequent and violent; the sardonic facies was marked; a portion of the abdominal and thoracic muscles were in contraction; respiration was difficult and deglutition was impossible.

At this stage an intracerebral injection of the antitoxin was made, six cubic centimetres of serum being injected into the right frontal lobe, at a depth of six or seven centimetres, and seven cubic centimetres into the left lobe.

This injection was made at five o'clock in the afternoon of the ninth day. Not until after ten hours had elapsed was an improvement apparent. Then beginning at three o'clock in the morning of the tenth day, the intervals between the convulsions began to lengthen, the respiration became less labored, and the contraction of the lower limbs lessened. From this time the condition steadily ameliorated. Meanwhile the other treatment was kept up as before with chloral and bromide and with subcutaneous injections of the serum in doses of ten centimetres. Within three days after the intracerebral injection the improvement had become very great; the trismus had disappeared, the neck had lost its rigidity, respiration, pulse, and temperature had become normal. Some cerebral excitement was noticeable. By the end of the week the cure was complete. The reporter notes that cases of tetanus with a period of evolution of fifteen days or more usually have a favorable prognosis, being amenable to medicinal treatment. In this case, however, notwithstanding its prolonged period of evolution, and the rather slow accentuation of the symptoms after their onset, a sudden and rapid

increment in the toxic symptoms took place at the end of the first week to such a degree as to plainly render the case desperate. As to the lack of benefit from the subcutaneous injections of the antitoxin, it is proper to call attention to the small doses which were administered, not more than ten cubic centimetres at any one time, and not more than thirty cubic centimetres during any one day were given. In the light of such an experience as that of Mixter, of Boston, recorded in the February number of the *ANNALS OF SURGERY*, it is fair to conclude that very much larger doses must be employed if any antidotal effects are to be experienced. This remark, however, renders still more signal the benefit that followed the intracerebral injection.

IV. Dr. Semple, assistant professor of pathology in the Army Medical School at Netley, reports the following case: A man, twenty-two years of age, was admitted to hospital on November 14, 1898, for contusion of the testicles caused by a bump on the pommel of the saddle. For a fortnight before admission he had been going through a course of rough riding in the riding school, and stated that he had had several falls and bruises. There were no open wounds, and the contusion of the testicles was not severe.

Onset of Tetanus.—On November 16, two days after admission, he developed symptoms of tetanus. The masseter muscles and the muscles of the neck were contracted, and those of the abdomen slightly so. On November 17 the spasm of the jaw muscles was marked, and there were also spasms of the muscles of the legs and arms, especially on examination. The abdominal muscles were also slightly contracted.

Injection of Antitoxin.—At 9 P.M. he was put under chloroform, two and one-half cubic centimetres of doubly strong antitetanic serum were injected into each frontal lobe of the brain. At the same time twenty cubic centimetres of antitoxin were given hypodermically in the flank.

After-History.—He had a good night, and on November 18 the tetanic spasms of jaws and stiffness of extremities continued as before, and his condition was unchanged; twenty cubic centimetres of antitoxin were given hypodermically.

On November 19 his condition was about the same; twenty cubic centimetres of antitoxin were given hypodermically.

On November 20 the spasms were less marked and not so easily excited by noise or other stimuli.

On November 21 the stiffness was less marked.

On November 22 his condition was improving; he could open his mouth without causing spasms.

On November 23 the muscles of the jaw and neck were free from spasms, but there was some stiffness of the limbs, and he started and had twitching of the muscles when he heard a noise, notably so when the camp gun went off on the hill a short distance from the hospital. The dressing was removed from the seat of operation and the stitches taken out. The wounds had healed by first intention.

On November 30 he was convalescent, but weak and anæmic. He was able to get out of bed, but had slight spasm of the arms on exertion. He presented no brain symptoms, ate and slept well. The temperature was practically normal throughout, pulse and respiration regular.

LEWIS S. PILCHER.

INDEX TO SURGICAL PROGRESS.

HEAD AND NECK.

I. The Operative Treatment of Empyema of the Frontal Sinus. By PROFESSOR DR. BARTH (Danzig). Acting on the principle that in suppurative disease of a rigid cavity an outlet must be provided at the lowest point, Barth has devised a simple and effective plan for the inspection, treatment, and drainage of the frontal sinus. A vertical incision two and a half centimetres in length is made near the side of the root of the nose. Through this the nasal bone and the nasal process of the frontal bone are divided with the chisel and turned outward. While only one skin incision is required, it is necessary to make three cuts in the bone, one vertical and two horizontal, so as to form a bone flap. The mucous membrane of the sinus bulging into the opening is opened, then cleaned, and temporarily packed. The upper part of the nasal cavity is next rendered completely free and patent by work done with chisel, bone-forceps, scissors, and forceps, so that there results a wide communication between nose and frontal sinus. Through the trap-door, which is the feature of this operation, one can examine the ethmoidal cells, and if they are involved can treat them. After again cleaning, if necessary curetting the frontal sinus, a drainage-tube is inserted between the nose and the sinus, and the external wound closed with sutures. Barth's patients have been able to resume their work as day-laborers in two weeks.—*Archiv für klinische Chirurgie*, Band lvii, S. 756.

II. The Surgical Treatment of Goitre, apart from Cancerous or Exophthalmic Goitre. DR. M. J. REVERDIN (Genève) classifies the indications for operation as follows: (1) Ur-

gency,—menaced respiration; septic inflammation; (2) necessity,—functional troubles, increasing size; inefficiency of medical treatment; (3) cosmetic.

Among the drugs which have been injected parenchymatously, none but iodine and iodoform have any value. The tincture of iodine often causes sudden or early death after injection, and in other cases, when it fails to benefit it, so modifies the goitre as to complicate operation. Iodoform has not these disadvantages, but, like iodine, is only efficacious in diffuse vascular goitres, which often recover under medical treatment (iodine, thyroidine).

Operative Treatment.—As regards anæsthesia, personal experience teaches the following: In simple goitres, with little dyspnœa, there is neither danger nor inconvenience from giving an anæsthetic, and ether is the best anæsthetic; in grave cases one must operate either without an anæsthetic or with local anæsthesia; in intermediate cases, when in doubt, do not use an anæsthetic.

Exposure of the Tumor.—The skin incision, with rare exceptions, is simple. Kocher's transverse incision gives the best scar, and furnishes better access than might be expected *a priori*; one may use oblique or curved, but never vertical, incisions. When dividing the subcutaneous tissues, the veins ought always to be doubly ligated before division. The sterno-mastoids are retracted, the infrathyroid muscles are divided, or, better, their fibres separated by a blunt instrument.

Covering the goitre there is now merely cellular tissue which must be cautiously divided. This is often and wrongly named the "true capsule;" it ought to be called the "aponeurotic envelope." The true or fibrous capsule belongs to the gland, and ought to be respected. When the aponeurotic envelope is divided, the goitre is exposed.

Description of the Various Operations.—Total extirpation does not require consideration, as it has been abandoned.

Partial Extirpation.—The goitre having been exposed, the diseased lobe is dislocated with the fingers, either from without inward, as is most common, or from within outward, after section of the isthmus (Poncet). The veins are now tied and then the arteries. While nothing need be said about the superior thyroid artery, the danger of injuring the recurrent laryngeal nerve complicates the ligation of the inferior. Billroth ties this artery close to the goitre, Kocher internal to the carotid, laying bare the nerve before applying the ligature. Neither of these procedures is absolutely safe. The author, as the result of investigations, finds that, when the curved transverse incision, with convexity downward, has been used, in retracting inward the carotid and internal jugular with the goitre, one is able to tie the inferior thyroid at the inner border of the scalenus, at the point where it bends on itself to become transverse, and as a consequence at a point remote from the recurrent nerve; the artery may be found just under the tendinous portion of the omo-hyoid and one centimetre below the carotid tubercle. On the cadaver this operation is not difficult. The last step in the extirpation consists in section of the isthmus and separation from the trachea. Kocher divides the isthmus, but leaves a portion of the tumor on the side of the trachea, so as to avoid possible injury to the recurrent.

In Wolff's operation digital compression limits the necessity for ligatures, in Doyen's the vascular pedicle is divided by a special crushing instrument. Morcellement has only been used by Péan, and it can be only an exceptional procedure.

Resection.—This operation has been systematized specially by Mikulicz, with the idea of preserving part of the organ, so as to avoid myxœdema. Here one or both superior thyroids are tied and one or both portions which are to be preserved are left attached to the inferior thyroids. In Hahn's operation the superior thyroids are ligated, the inferiors are simply compressed with forceps, the blades of which are covered by rubber,

while the resection is being made. Zoege von Manteuffel uses digital compression of the inferior vessels during resection. Ostermayer seizes the tumor with a strong forceps, cuts off all in front of the forceps, and ligates the mass in the clamp by a chain of ligatures.

Intraglandular Enucleation.—The goitre having been exposed, the glandular tissue enveloping the tumor is divided, and the encysted tumor is enucleated with the finger or blunt instruments. This procedure may be adopted whether the tumors be single or multiple. Rose applies, temporarily, an elastic band around the base of the tumor. Roux sometimes ligates the arteries, Niehaus compresses them with protected forceps.

Evidement (Kocher).—The tumor is opened and its contents evacuated with the finger or sharp spoon.

Massive Enucleation (Poncet).—The tumor is incised and all its nodules or cysts removed *en bloc*, if possible, without going outside the capsule.

Operations applied to cysts are the following: Simple puncture, puncture and injection of irritants, drainage, incision with or without resection and suture to the skin; enucleation. The last named is the operation of choice; incision is an exceptional method; all the others ought to be abandoned.

Comparative mortality of the various operations, based on 3408 cases communicated in detail to the author.

Total extirpation, 18.97 per cent.; partial extirpation, 3.46 per cent.; intraglandular enucleation, 0.78 per cent.; resection, 6.66 per cent.

The number of cases submitted to other operations and reported is too small to permit of drawing conclusions.

Study of the causes of death show that respiratory complications are specially to blame, then come circulatory troubles,—tetany, myxœdema, hæmorrhage, and septic complications. After enucleation, there has not been a single death from hæmorrhage, sepsis, tetany, or myxœdema.

The non-fatal accidents which may be encountered are divided as follows: (a) accidents due to lesions of neighboring organs; (b) due to infection; (c) due to suppression of the thyroid function. In the first category there is the entrance of air into veins, which is easily avoided by a good technique; arterial hæmorrhages primary, retarded, or secondary; the last is due to infection, and the second to badly placed ligatures or to the struggles of the patient. As to primary hæmorrhage, an operator with any experience need have little fear, but the author considers the operations of Wolff, Hahn, and Zoege von Manteuffel dangerous in this regard.

The dangers from primary hæmorrhage during enucleation have been much exaggerated, yet one ought always to be ready to change from this operation to extirpation if bleeding is too free; the need to do this is very rare.

Injury to nerves, particularly the recurrent, may occur in any of the procedures, but less easily during enucleation. Tracheotomy should be avoided, if possible, because of the danger of infection. It is rarely necessary.

Tetany and myxœdema—both due to suppression of the thyroid function—are most common after extirpation, and are exceptional after partial extirpation, and rarest after enucleation. The author knows of but two cases of tetany and two of myxœdema following Socin's operation (enucleation).

Enucleation is the operation of choice. Its mortality is lowest; there is least danger from tetany and myxœdema; it has no greater danger from primary hæmorrhage than have the other operations. True, it is only applicable when the goitre (solid or liquid) is encysted and has not been treated by irritating injections, but these conditions are realized in the vast majority of cases.

M. SOCIN (Bâle) has given up the use of ether and uses chloroform rarely. In his last 110 cases he has used cocaine ninety-one times and chloroform nineteen times. In his last

200 operations there were 117 enucleations, sixty extirpations, and twenty-three combined operations. In 160 cases recovery was obtained in from five to eight days. In one-third of the cases no drain was used; in the remaining two-thirds it was removed after twenty-four hours. There was only one death; cause metastatic pneumonia with myocarditis.

M. Roux (Lausanne) operates without any anæsthetic. He claims the operation is less bloody, easier, and less dangerous, in that the patient always warns the surgeon as soon as the trachea is dragged upon or bent. More than one tracheotomy has been avoided by the absence of an anæsthetic. For those who attribute all post-operative pneumonias to the anæsthetic it may be noted that post-operative pulmonary engorgements do occur in Roux's cases. In cases where the whole goitre is pregnant with cysts, hæmorrhage is liable to be very abundant, and even if not alarming, it is avoidable by ligation of the inferior thyroid, immediately after the enucleation. The enucleation having been rapidly completed, the rest of the tumor is pulled, by means of forceps on the capsule, towards the middle line. The main tumor having been removed, the trachea is not compressed by this procedure. The trunk of the inferior thyroid can now be palpated and exposed in half a minute. It is tied, not too tightly, with thick catgut near its entry into the goitre. This step is taken not only in all enucleo-resections, but whenever any enucleation is bloody. It saves ligatures in the tumor-bed, and is the best means of avoiding lesions of the recurrent.

Of 225 cases Roux has lost three,—*i.e.*, 1.27 per cent. Enucleation alone or combined with ligation of the arterial trunk was done in ninety-two cases, all the others were operated on after Kocher's method.

En résumé, he incises most cases of strumitis, though in some he enucleates. For all non-vascular cysts he prefers Socin's enucleation, combined in complex or bloody cases with ligation of the thyroid trunk. In all other cases he follows Kocher.

M. PONCET (Lyon) defended his method of "*enucleation massiv.*" There is no need for preliminary ligation of the thyroid in such cases. Usually there is little bleeding, but if, perchance, there should be hæmorrhage the wound may be lightly packed and the thyroid flaps basted.

M. GIRARD (Bern) thinks that all goitres should be operated upon because of the real dangers from degeneration and suppuration. Pregnancy does constitute a contraindication. He has operated successfully in three cases from three to six months pregnant and in two at term. In his 545 operations he has had only six deaths.

M. BERARD (Lyon). After operations on the thyroid the temperature often runs up to 102° or 104° F., and remains high for eight or ten days. This has no grave prognostic significance, even when accompanied by tachycardia and nervous symptoms. It is due to the fact that goitrous thyroid glands secrete substances capable of raising the temperature, and that such material is suddenly let loose during operations.

M. SCHWARTZ (Paris) has long ago abandoned all non-operative treatment. He almost always uses ether or chloroform, and has observed no injury from so doing. He has on several occasions practised Poncet's hæmostatic suture of the glandular capsule with good results.—*Transactions of the French Congress of Surgery*, 1898; *Revue de Chirurgie*, November, 1898, Supplement.

III. A New Method of Temporarily Resecting the Palate. By PROFESSOR DR. PARTSCH (Breslau). After criticising the various methods which have been devised to give access to naso-pharyngeal tumors arising from the base of the skull, the author describes an operation which he has devised and carried out successfully in one case. The operation is as follows: Incision along the line of reflection of the mucous membrane from the lip to the alveolus of the upper jaw. This cut is made

from the second molar of one side to the second molar of the other. The bone is exposed with an elevator. The nasal cavity is opened by division of the mucous membrane all round the pyriform opening. The soft parts are retracted upward. With a chisel the nasal septum is divided just above the floor of the nose. In the same way the anterior and external wall of the antrum of Highmore is divided, just above the antral floor, as far back as the maxillary tubercle. With moderate pressure it is easy to turn the whole palate and alveolus downward like a trap-door. This gives a space in which the tumor will be found to lie within easy reach. After removal of the tumor the displaced tissues are readily replaced, and the wound in the mucous membrane is sutured. The bones readily unite and no visible scar is left.—*Archiv für klinische Chirurgie*, Band lvii, S. 847.

JOHN F. BINNIE (Kansas City).

ABDOMEN.

I. The Vaginal Route in Operations for Cancer of the Rectum. By W. LIERMANN (Frankfort). Rehn, of Frankfort, in 1895 first pointed out the advantage which the vaginal route offered over the sacral in amputation and resection of the rectum in women. Cancer of the rectum affects both sexes about equally, but operative relief for stricture is much more commonly required in women.

The great advantage of this method lies in the possibility of plainly seeing every step of the operation, which in the sacral route dissection of the anterior surface must be done more or less blindly, necessitating too free use of blunt dissection, thereby endangering the vitality of the bowel. The vaginal method gives a clear view of the peritoneal fold, should it be necessary to enter that cavity. Moreover its closure by sutures is quite simple, but the same cannot always be said of the sacral method. If the process has attacked the vaginal wall, no further method is needed

to deal with this condition than is employed to approach the rectum.

The operation is done in the lithotomy position, and the hips are not elevated, unless there is a prolapse of the intestines, which cannot be held back by gauze pads. The rectum is first packed with gauze. The vaginal walls are retracted to either side by long narrow specula. An incision is made in the median line, beginning just under the cervix and carried down to the vaginal outlet. The incision is now carried down to the rectal wall, the cut surfaces being still more retracted. An incision is then carried from both angles of the wound towards the upper pole of the anus, and the latter separated by a semicircular incision from either side. The two incisions meet below in the median line, and are continued down to the coccyx. The rectum is freed on its anterior surface, the anus seized by forceps, and by making suitable traction on this the bowel is made free on its lateral aspects, and the peritoneal reflection opened. Drawing the gut well forward, it is freed posteriorly chiefly by blunt dissection. The rectum is now quite free, can be drawn well upon the symphysis and in either direction, allowing of very free access for all manœuvres, and easy closure of the peritoneum. The vaginal incision is now sutured, and the perineum likewise with deep sutures. The rectum is rotated twice on its axis, and secured in this position by sutures passing through the muscular coat and into the skin, and the distal portion cut off, then further suturing of the mucous membrane to the skin.

Four illustrative cases are given in detail.—*Beiträge zur klinischen Chirurgie*, Band xix, Heft 3.

C. L. GIBSON (New York).

REVIEWS OF BOOKS.

ANNUAL AND ANALYTICAL CYCLOPÆDIA OF PRACTICAL MEDICINE. By CHARLES E. DE M. SAJOUS, and One Hundred Associate Editors. Vol. II. *Bromide of Ethyl to Diphtheria*. Large 8vo, pp. 607. Philadelphia: F. A. Davis Company, 1899.

The second volume of this series sustains the expectations formed from the first volume. The general character of the Cyclopædia was fully commented upon in the review of the first volume, which appeared in the ANNALS OF SURGERY for August, 1898. The present volume contains less of surgical interest than the preceding one, an excellent article on cholelithiasis, by J. E. Graham, of Toronto, being the chief contribution of this nature. The article on chloroform is by the chief editor, Dr. Sajous, and gives a clear and full statement of present knowledge on the chloroform question. It is a most excellent and judicious digest of the recent literature on this subject. The article on Diphtheria is by Drs. Northrup and Bovaird, of New York. It is an eminently satisfactory article. The amazing change in the ability to successfully treat this disease, effected by the use of the antitoxin, is fully set forth. In no form of the disease does this appear more strikingly evident than in that attended with laryngeal stenosis. Antitoxin plus intubation now saves two-thirds of all such cases, and the indications for tracheotomy have at the same time become so greatly restricted that it is now rarely resorted to. We shall await with interest the appearance of the further volumes of this Cyclopædia.

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PARTIAL ENTEROCELE.¹

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IN the year 1598 Fabricius Hildanus had for a patient a lady of sixty-three years of age, who for seventeen years had suffered from a hernia in the groin. This had suddenly become strangulated and had apparently been reduced *en masse*. Gangrene supervened and an abscess formed, which eventually burst externally, discharging fæces. This fæcal discharge continued for some two months, at the end of which time the fistula spontaneously closed. Hildanus at no time saw the intestine, yet, from the insufficient evidence related, he drew the conclusion that a part only of the circumference of the intestine was constricted, one of his chief reasons being the happy ending of the case.

For nearly a hundred years the subject was undiscussed. In 1700 Littré published his now world-famous article, "Observation sur une nouvelle espèce de Hernie." This treatise contained the histories and pathologic findings in three hernia cases which the author had met with in 1699. In conclusion it also contained deductions made from these cases. The first case occurred in a male, forty-eight years of age, who died with a hernia of the left groin. In the sac of this hernia was found a curiously shaped appendix having a large base or pouch below, and being narrower at its upper part where it communicated with the lowest part of the ileum. From Littré's description, and from the illustration which accompanies it, it is evident that this, Littré's first case, was

¹ Read before the Brooklyn Surgical Society, March 2, 1899.

one of a diverticulum (first accurately described by Joannes Meckel in 1815-1820) of the ileum. Not by any possibility could it have been a partial enterocele. The second case was that of a man of thirty-four years, who died of a fever. There was found at the necropsy a hernia of an appendix of the ileum, which was engaged in the ring. It is specifically stated that this hernia was not strangulated. From the description it is somewhat difficult to determine just what variety of diverticulum was present in this case. There is abundant evidence that there was a diverticulum present, but the question is, Was it a congenital diverticulum; was it a diverticulum formed by continued traction on part of the wall of the small intestine in a hernial sac of long standing, or was it a diverticulum such as is sometimes formed by a rupture of a small portion of the muscular coat of the intestine, and a consequent pouching of the mucous and serous coats from causes working from within? It might have been any one of these chronic forms, but it could not possibly have been an acute partial enterocele. Whether it was a partial enterocele or a congenital diverticulum it is impossible to definitely say. The consensus of opinion seems to be that there was present a chronic hernia of a pouching of the ileum wall, congenital or acquired. Littré's third case was that of a man who had a tumor in the groin, of which he died in five days. Decomposition had advanced too far to permit of any anatomical study of the parts; so this case is worthless. In 1701 Mery reported a case of hernia, which appears to have consisted of an abnormal diverticulum of the ileum, the same which we to-day designate as Meckel's diverticulum. Previous to both Mery and Littré, however, J. H. Lavater had written ambiguously of the possibility of partial enterocele. In 1714, Littré again wrote about a case of hernia of a rare type ("Sur une Hernie rare"). This case was, beyond doubt, a hernia of part of the wall of the colon. Between that time and 1800 some eight writers referred in one way or another to this form of hernia. The most important of these was Augustus Gottlob Richter, who in 1778-1785 pub-

lished a work entitled "Abhandlung von 'den Brüchen." This work was translated into French by J. C. Rougemont in 1788. In it Richter devotes an entire chapter to partial enterocele, but limits it to small hernias between the ensiform and umbilicus. This chapter, though the best article written up to that time, was not very good. In the same year (1788) Adolphus Murray wrote "Animadvers in hernias incompletas casu singulari illust.," which was, as is seen from the title, a treatise on incomplete hernia. The next article throwing light upon this form of hernia appeared in 1809, when Antonio Scarpa, of Milan, published a series of experiments, showing that when over two-thirds of the circumference of the gut was constricted so as to shut off two-thirds of the lumen, a complete obstruction existed due to the kinking of the remaining third of the gut; but, on the other hand, if only one-third of the lumen was shut off fluid could still pass through the remaining open portion. It was in 1815-1820 that Joannes Meckel, in a work entitled "Handbuch der menschlichen Anatomie," published at Halle, first definitely described the diverticulum which bears his name. Such men as Sir Astley Cooper and Velpeau mentioned the occurrence of small herniæ between this time, 1820 and 1841, when C. F. Riecke published his "Ueber Darmanhangsbrüche (Hernia Littrica),"—that is, "Partial intestinal wall Herniæ." This was the best work published up to date, and showed evidence of great care in its preparation. Some dozen writers referred to this form of hernia between 1841 and 1868, when Wallenstein produced his book "Ueber die Hernia Littrica (Darmanhangsbruch)." Gross in 1872 devotes half a page to Littré's hernia, but throws no new light upon it. In 1879 both Loviot and Defaut produced theses, the one upon "Du Pincement herniaire de l'Intestin," the other "Du Pincement latéral de l'Intestin." In 1883 Adolph Lorenz published in Vienna "Ueber die Darmwandsbrüche." Hager wrote a book on the subject in 1884. Keetley, Sebenkow, and Morgan reported cases about this time. One of the most instructive cases was published by Dent in 1882. In 1887 Treves

wrote his paper upon "Richter's Hernia or Partial Enterocele." This is most valuable for statistical purposes. Since that time Stahl read a paper—"Acute Partial Enterocele"—before the American Medical Association; in addition some few cases have been reported up to January 1, 1899. A full bibliography will be found printed at the conclusion of this paper. It has been my endeavor to verify, combine, and sift the reported cases in such manner as, combined with my own cases, to present as typical a clinical picture of this form of hernia as possible.

As seen from the nature of the bibliography partial enterocele is comparatively rare, though not rare enough to form a surgical curiosity. It is only by the reporting of every case with a full history that we can ever hope to increase our knowledge of diagnosis, and by this means lower the alarming death-rate.

Many different terms have been used in describing Littré's hernia. French: Pincement herniaire de l'intestin; pincement latéral; hernie partielle. Italy: closely follows French. German: Darmwandbruch; lateral bruch; partial bruch. English: Partial enterocele; parietal enterocele; small hernia (Cooper); incomplete hernia (Gross).

Concerning the anatomy of the form of hernia now occupying our attention, there is this to be said, and, so far as I know, it has never been stated in exactly this way, yet every one of these statements is supported by incontrovertible cases. Littré's hernia may occur at any of the hernial sites, or it may be ventral, or occur in the supernumerary sac of an interstitial hernia; it may be composed of jejunum (Dent), ileum, or colon, with which may or may not be associated more or less omentum (generally no omentum, five cases, two inguinal, three femoral, over two years); the amount of intestinal wall included is never the complete circumference; the intestinal wall may or may not be adherent to the sac; this is also true of the omentum when present; the included intestine may be a congenital diverticulum, a congenital pouching, an acquired diverticulum, an acquired pouching,

or an acute constriction of a theretofore normal portion of the circumference of the gut; if a congenital diverticulum or pouch, it is the result of an error in development, as in the case of Meckel's diverticulum; if an acquired diverticulum or pouching, it is due to change in some portion of the intestinal wall, by which the muscular coat is weakened or ruptures, permitting the mucous and serous membrane to pouch, they being less able to stand the pressure of gases from within than the neighboring healthy intestinal wall; this may be presumably caused by traumatism to the wall of the gut involving loss of blood-supply, nerve disturbance, or to unequal changes as age draws on; this acquired diverticulum or pouching may also be due to the adhesion of a portion of the intestinal wall to the peritoneum over a natural or acquired hernial opening, and thus, propelled along by the ever varying intra-abdominal pressure, in time becomes a thinned-out funnel-shaped diverticulum or pouch, or it may be that a loop adherent in this way is present in a hernial sac of some duration or one that that very loop has been instrumental in forming, and that the varying pressure conditions at work within the peritoneal cavity and within the bowel (peristalsis, etc.) cause this loop to be pulled upon, and so in time produce a diverticulum or pouch. An acute constriction may be produced in two ways: a portion of the gut circumference may be caught while entering the sac or while withdrawing from it, or some strain may result in the formation of both sac and hernia simultaneously, and only a portion of the bowel circumference be caught; partial enterocele may be acute with the simultaneous formation of a sac, may be acute into an old hernial sac, may be chronic in an old hernial sac; the condition of the bowel may be normal, or reach any stage from simple congestion to gangrene with perforation; adhesions may or may not be present, rarely in the acute form, commonly in the chronic form; the chronic form may at any time become acute; the constricting agent may be either the neck of the sac or the various hernial openings; there may be complications, hydroceles, and adenitis.

Littre's hernia is a partial enterocele,—that is, an occlusion or strangulation of a portion of the circumference of the bowel, four-fifths, two-thirds, one-half, or less of the circumference, as the case may be, probably in the majority of the cases less than half of the circumference, the result being that only a portion of the lumen of the gut is occluded; hence the passage of gas and fæcal matter is not altogether interfered with, at least, not until the bowel wall is paralyzed by the neighboring strangulation. In fact gas may be passed throughout, and in three cases of the fifty-three collected by Treves and including all reported cases up to 1886, there was persistent diarrhoea. In these cases about one-third varied in symptoms in no way from ordinary strangulated hernia. In the remaining two-thirds the symptoms were of a much less severe character than those encountered in ordinary strangulated cases. In one-tenth of these latter there were *movements of the bowels* on the first or second day of strangulation. In other cases the bowels continued to act from time to time. Some moved daily without medicine, others moved when medicine looking to that effect was given. In others the bowels moved unaided on the third, fourth, fifth, or sixth day. As previously indicated, the more the lumen of the gut is occluded, or the tighter the strangulation, the nearer do these cases approach in symptoms the ordinary forms of strangulated hernia.

This form of hernia is more common in females than in males, and appears to be limited to adults. It is more frequent upon the right side than upon the left. Naturally it may occur through any of the hernial openings, but is confined almost exclusively to the femoral and inguinal region; more frequent in femoral than in inguinal. Anderson, of Nottingham, in the *Lancet* for April 2, 1892, reported a case of ordinary strangulated femoral hernia in which operation failed to relieve the symptoms. Subsequently an abdominal section was done. It was then found that part of the circumference of a knuckle of small intestine had been nipped in the left obturator foramen. On withdrawing this rupture oc-

curred. A resection with Lembert's suture was done. Unfortunately the patient died in a few hours. Littré's hernia occurs in old herniæ, rarely in those of recent date, and I should say almost exclusively in reducible rather than in irreducible herniæ. The *size of the tumor* varies, but is always small, except in those cases in which rupture into the hernial sac has occurred with its consequent distention. The size is also dependent upon the presence or absence of fluid in the hernial sac. It is, however, never larger than a hen's egg, except in cases of rupture or when complicated by hydrocele of the cord. E. Owen, of Manchester, reported a case complicated by hydrocele (*Medical Press and Circular*, London, November 25, 1891). This case recovered.

The ileum is the portion of intestine most commonly affected; the constricting agent being in the case of femoral hernia, the crural ring; in inguinal hernia, the neck of the sac. Cases involving the jejunum (three) and colon (three) have been reported.

As regards the pathologic appearance of the gut, in those cases operated upon before rupture is imminent or has taken place, there is a well-marked circle to be seen upon that portion of the gut farthest from the mesentery; in cases that rupture at the time of operation or previous to it, the intestine presents a fairly clean-cut circular opening in the same location. Adhesions do not seem to be noted in many cases. In the unruptured case the included bowel wall presents at the crural or internal inguinal ring, as the case may be, as a small, balloon-like tumor varying in size from the tip of the little finger to the size of a walnut, and of a color varying in proportion to the duration and intensity of the constriction.

Vomiting is not uniformly present, according to Treves. Probably, in the majority of cases, the vomiting is less frequent and less severe than in ordinary strangulated herniæ. It may be present from the start or may begin on the second day, and may even become less urgent as time progresses. In several of the cases collected by Treves the vomiting did not occur more than three times a day, and only in rare cases

did it become faecal (six cases). In these six cases, the faecal vomiting appeared in one case on the fourth day and latest on the eighth day. Some cases passed bloody mucus after a purge.

Hiccough is a rare symptom, and when present is of late occurrence.

Distention is never marked.

Diagnosis is between partial enterocele, diverticular hernia (Meckel's), small incarcerated omental hernia, and inflammation in a hernial sac. It may be further complicated by enlarged glands. Generally only a single gland which may serve to obscure the hernia.

Prognosis is bad, but the high mortality seems to depend rather upon the failure to make a diagnosis than upon the necessarily mortal nature of the hernia, when operated upon *early*. In nearly 50 per cent. of the reported cases the trouble was not recognized, and all these cases died. The amount of obstruction to the passage of gas and faeces has nothing to do with the prognosis. All those cases not operated upon die. It is conceivable, however, that strangulation might exist for a short time and be relieved without operation; but such cases have not been reported, and if they were reported, from the very anatomical nature of the affection would be impossible of proof. Aside from the difficulty of diagnosis, the reduction by taxis is so difficult that several cases of reduction *en masse* have been reported. *Taxis* has been tried in the majority of reported cases, four of these were reduced *en masse*,—three femoral and one inguinal; and two femoral cases that were successfully reduced died from acute peritonitis. Taxis, except to a moderate degree, and in exceptional cases,—cases seen in their incipency,—should never be indulged in. Gangrene occurs in the femoral more frequently than in the inguinal variety; again, there is more difficult diagnosis to blame. It has occurred as early as the third day. Treves says that herniotomy in these cases reaches the highest figure (62.2 per cent.). Again, we can blame the difficulty of early diagnosis. Briefly, we may say that cases not operated

upon die; that cases in which the diagnosis is made late die; that the only cases which recover are those recognized early and operated upon at once; that temporizing methods are necessarily fatal.

Treves's cases were four in number, and as they are exceptionally interesting I will give a brief *résumé* of the history in each case. Three of these cases died and one recovered. All were operated upon.

CASE I.—July 24, 1883; female, aged sixty-two years. Small, right-sided, femoral hernia. Three days before admission she had experienced sudden pain in the region of the femoral canal with loss of appetite and prostration. On the second day she had vomited, had had some distention, and some colicky pain. She refused operation, so an ice-bag was applied. Five days from the onset, as there was no improvement, she submitted to operation. A partial enterocele of one-third of the circumference of the ileum was found. This was gangrenous. Two inches of the gut were excised. Death occurred two days later. There was constipation throughout. The specimen is to be found in the Museum of the Royal College of Surgeons.

CASE II.—August, 1884; female, aged forty-eight years. She had had a right femoral hernia for twelve years, which had always been reducible. Had never worn a truss. This had become strangulated. She had pain, and twelve hours afterwards an attack of vomiting. Her bowels moved on the first day. Operation was performed on the third day. A partial enterocele of the ileum was found without any gangrene. The vomiting continued. There was free purgation on the fifth day. Death occurred on the sixth day following operation from a low grade of peritonitis. No autopsy.

CASE III.—March 3, 1885; male, aged sixty years. Small, right-sided, femoral hernia for eighteen years. Patient very thin. No truss. No previous trouble. Three days before admission patient coughed. There was pain at hernial site and tumor. Taxis was tried and failed. A poultice was applied. Bowels moved on evening of first day. On second day there was vomiting, pain increased, and there was hiccough. On the fourth day he was operated upon. Partial enterocele of ileum. There was omentum in the sac. Death occurred on the sixth day. He had

had absolute constipation after the first day. Autopsy showed a perforation at the site of the constriction. The specimen is in the Museum of the College of Surgeons.

CASE IV.—August 6, 1885; male, aged forty-four years. For two years had had a right oblique inguinal hernia; was of size of walnut, and had always been reducible. Had worn a truss irregularly. Three days before admission had undergone severe exertion; had pain in hernia, which had become irreducible. He had colic and in two hours slight vomiting. In three hours had a movement of the bowels. Next day bowels moved copiously, after that constipation. On second day hernia was reduced after thirty minutes' violent taxis. He vomited seven times on that day and three times next day. On admission to hospital his condition was good. On operation the hernial sac and contents were found reduced *en masse*. The sac contained a little omentum and a part of the circumference of the ileum, the size of a cherry, which was of deep purple color. The lumen of the intestine was free near the mesentery. The case made a good recovery.

Dent's case (*Clinical Society's Transactions*, Vol. xv, p. 16, 1882) is so interesting that I may be pardoned giving an abstract of it.

CASE V.—Male, aged thirty-seven years. Operation. Partial enterocoele. Died sixth day of "enteritis." Sac was old and just admitted little finger. Autopsy showed a gangrenous spot on the jejunum at the site of the hernia. There was present a diverticulum one inch in length corresponding to Riecke's diverticulum acquisitum.

My own cases were two in number, one male, one female; one femoral, one inguinal; both acute, one in a recently formed sac and the other in a previously existing sac. The histories are as follows:

CASE VI.—H. S., a butcher, seventy-two years of age, was admitted to the Brooklyn Hospital, service of Dr. George R. Fowler, December 13, 1898. I saw the case at 6 P.M., and ordered him prepared for operation at 7 P.M. The man's general appearance was that of profound depression; face anxious, pupils contracted from opium, pulse 112, respirations 24; tem-

perature $98\frac{2}{3}^{\circ}$ F. The abdomen was slightly distended. Just previous to my visit an enema had been administered, which brought away some faecal matter and gas. There was a tense, tender swelling in the left femoral region, extending upward over Poupart's ligament, of a pyriform shape, and the size of an egg. Percussion over this gave tympany. The history obtained from him by the ambulance surgeon, who saw him at his home, and by myself, when I saw him at the hospital, is as follows: He had never had such an attack before. He denied that he had ever had a hernia or worn a truss. He had had a severe cough for some time past. Seven days before admittance he had lifted a large piece of meat from the ice-box in his shop, and had felt a severe pain in his groin. He then noticed a lump, which gradually grew larger and was markedly tender. His bowels moved on this day and on the day following. They did not move on the third day, but gas was passed. Tumor became more and more tense and red, but patient did not go to bed. Vomiting began as early as the second or third day; was marked at first but gradually decreased; was faecal on the seventh day, and had been so for two days. His attending physician saw him on the first or second day of his illness, and advised operation, which was refused. Two days later a consultation was held and again operation was advised and refused. On the fifth or sixth day an anæsthetic was administered and taxis tried, but this failed. Finally the ambulance was summoned from the Brooklyn Hospital and the patient conveyed there, where I saw him for the first time. Bearing this history in mind, it was comparatively easy to arrive at a diagnosis of strangulated hernia; the contents of the sac being composed of omentum alone, which would account for the symptoms, except the tympany, or composed of a portion of the circumference of the bowel,—Littre's hernia or Littre's hernia plus omentum. The second was decided on the most plausible explanation. Inasmuch as there had been strangulation more or less complete for seven days, the patient was told of the serious nature of his case and the probability of a fatal ending.

The operation, in brief, consisted of a four-inch incision over the tumor and extending beyond it, and the isolation of the sac. When the sac, which was thin, was opened there was an immediate gush of liquid fæces. This was sponged away, but no bowel

was found in the sac. There was a mass of omentum sodden with fæces. This was pulled out and ligated. The sac, gangrenous in places, was cut away, and an incision carried into the peritoneal cavity at an obtuse angle to the first. The ruptured intestine was sought for, and found to be a knuckle of ileum lying near the middle line. This had scattered fæcal matter broadcast throughout the peritoneal cavity. From the manner in which the fæces had been carried to the distant portions of the cavity this must have happened some few hours before. The ruptured loop was pulled out and examined. It was found to have in it a large aperture comprising four-fifths of the circumference of the gut. There still existed a bridge of intestine at the mesenteric border, representing the remaining fifth of the circumference. No other portion of the intestine was marked in any way. This opening was closed temporarily, and several gallons of hot saline solution were used to flush out the peritoneal cavity. To aid this my assistant, Dr. Ira Ayer, made a right-sided laparotomy at the level of the umbilicus, while I did the same upon the left side. Salt solution was poured in one of these openings, and with the aid of stick sponges the intestines were thoroughly washed, the fluid escaping by the other side and from the opening below. When this ran clear the peritoneum was sponged dry and numerous wicking drains inserted so as to drain all parts of the peritoneum. The ruptured loop was now sutured in the lower incision and the femoral incision closed. The loop was then opened, thus forming an artificial anus. Copious separate dressings were applied.

The anæsthetic was begun at 6.55 and stopped at 8.30, one hour and thirty-five minutes, during the last twenty minutes of which oxygen was administered. The operation, inclusive of scrubbing and dressing, occupied one hour and twenty minutes. Strychniæ sulphas, one-twentieth grain, and whiskey *ad libitum*, were the only stimulants used. The patient left the table in a deeply depressed state, from which he did not rally, but died some five hours later.

CASE VII.—A. G., a Swede, forty years of age, married, was admitted December 15, 1898, to the Methodist Episcopal Hospital, service of Dr. George R. Fowler, where I saw her for the first time at 3 P.M. Her history in brief was as follows: She had had a small inguinal hernia for five years, but

never before had had any trouble from it. She had always enjoyed excellent health. Three days before admission she was seized with a sharp attack of pain over the site of the hernia. There was then present a very small "lump." Soon after this she began to vomit, first stomach contents, then bile; apparently no fæcal vomiting. Constipation since that time. Vomiting has been persistent. There has been a moderate amount of pain, both general abdominal and over the left inguinal region. Examination revealed an abdomen presenting the usual signs of about a six months' foetation. Vaginal examination revealed nothing amiss with the uterus. At the site of the left inguinal canal there was moderate tenderness and a sense of fulness in the canal, more than could be accounted for by the presence of the enlarged round ligament and more than could be felt on the right side. Abdomen, except over uterus, was tympanitic. There was slight abdominal tenderness. Pulse 108, respirations 30, temperature 100° F. I felt positive of the existence of a Littre's hernia at the neck of the old hernial sac, but the woman's condition seemed so good that I felt that temporizing measures might be indulged in for a few hours. I used moderate pressure over the internal ring. This gave rise to decided pain. An enema of ox-gall, magnesium sulphate, glycerin, and water had been given her before I saw her, and had been effectual in bringing away some fæcal matter and gas. Subsequent to this she had vomited six ounces of light-green fluid, and shortly afterwards four ounces of dark-green fluid. I ordered an enema with turpentine, which brought away some gas, but no fæcal matter. I saw the case again at 4 P.M., when the temperature had risen $\frac{2}{3}^{\circ}$. Respiration had come down from 30 to 24, and pulse from 108 to 99, though not of so good quality. A second ox-gall enema was ordered for 5 P.M. This brought away neither gas nor fæcal matter. At that time there was severe pain in the stomach and the vomiting of two ounces of dark-green fluid. As the case was a shade worse than on my previous visit, operation was decided upon.

Chloroform was used to initiate anæsthesia and then ether to prolong it. The duration of the anæsthesia was thirty minutes. This was followed by fifteen minutes of oxygen, given to clear the lungs of ether and prevent anæsthetic vomiting. I have made this a routine procedure and have found it effectual.

Duration of operation, twenty minutes. Briefly, the operation consisted in a two-and-one-half-inch incision, slightly curved to conform with the natural cleavage of the skin, over the course of the inguinal canal. The aponeurosis of the external oblique was incised for the full extent of the canal and for half an inch above the level of the internal ring. The sac was identified and opened. There was a very slight amount of fluid in it. This was sponged away. At the neck of the sac was seen projecting a small portion of gut, approximately the size of the tip of the little finger. This was dark red in color and was so tightly constricted that pressure from above could not displace it. The neck of the sac was incised from above the internal ring, and cutting in the direction of the canal towards the gut with the belly of the knife. Extreme care was necessary in order to do this without injury to the gut. The imprisoned gut was thus released and brought into the wound. It was found to be ileum. On its convex surface, directly opposite the mesentery, was a beautifully marked ring of constriction, of a purple color, one-quarter of an inch in width, and surrounding an area of the size of a silver quarter, and of a dark-red color. This area and ring was demonstrated to those present to view the operation, and was then subjected to a gentle massage with the forefinger and thumb. It readily approximated its normal color, though a partial congestion still remained. The enlarged round ligament was demonstrated, but not disturbed. It had no connection with the hernial sac. The gut was replaced in the peritoneal cavity. There was no pouching of the gut. The sac was now excised, particular care being taken to bring forward fresh peritoneum so as to leave no portion of the neck of the sac, which was somewhat thickened. The body of the sac was found somewhat flattened and spread out. It did not go beyond the external ring, but rather had dissected its way, and was spread out between the external oblique muscle and its aponeurosis, in the direction of the middle of Poupart's ligament, forming what has been recently described by McAdam Eccles, of London, as the first variety of interstitial hernia. The opening into the peritoneum was closed with a plain gut suture. The muscles were sutured to Poupart's ligament. The aponeurosis of the external oblique was sutured with a double over-and-over continuous suture of chromic gut. A subcuticular, reinforced by three or four interrupted silk sutures, was used for the skin.

There was no vomiting following operation and only slight abdominal pain, which quickly disappeared. Pulse, 98; temperature, 99.4° F.; respirations, 24. A small enema was given night and morning for the first two days following operation, then one enema daily. The wound was dressed on the seventh day, the skin suture removed, and a small amount of sero-pus evacuated from the superficial area. This area quickly healed. The pregnancy was in no way disturbed by the operation.

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OBSERVATIONS ON THE USE OF THE GALVANIC CURRENT IN THE TREATMENT OF FALSE ANKYLOSIS.¹

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IN considering the prognosis regarding an injury or disease in or about a joint, no more vexing question arises than that concerning the amount of motion the patient will obtain; and the answer, governed by so many factors, must of necessity be vague. It is always possible, and often probable, that a joint more or less stiff will result, and that such stiffness may last indefinitely. And again, after cure of the injury or disease, when we are consulted as to the treatment of the stiffened joint, our answer as to the result of any line of treatment is usually as uncertain as our prognosis.

There is hardly one joint in the body the usefulness of which, when lost, does not become so valuable, but that a patient or surgeon will be willing to spend considerable time and trouble to restore its function as much as possible. Unfortunately, many cases of false ankylosis will not yield to any known form of treatment; but, on the other hand, many joints which have become ankylosed might have been improved, and some of them cured, by more prompt and energetic measures on the part of the surgeon, and persistency and tractability on the part of the patient. And if, in cases which are now intentionally left to be cured by continued use of the part by the patient, the time could be shortened, at

¹ Read before the New York Surgical Society, January 11, 1898.

least there would be this gain, and the danger of permanency of the condition diminished.

Two general groups of cases of false ankylosis may be made: the one due to traumatism, the other to disease. With regard to prognosis and treatment, the two differ mainly as follows:

In cases due to traumatism the process is acute; the part is available for treatment nearly always within two or three months, often much sooner, and there is the usual tendency to resolution and repair, which is manifested in all derangements due to traumatism. There may be a disturbance of the bony parts of the joint which may interfere with normal motion; or repair may be so vigorous that an excess of bony development will obstruct motion in the same manner. One or the other of these changes is, I believe, quite often the cause of the persistency of stiffness, and of the failure of treatment of any kind other than operative. A notable example is the overgrowth of bone, which frequently limits motion after injury to the elbow.

In cases due to disease, the local process is most always a part of a general disorder, which, even if not active at the time, may become so; and the local condition is usually progressive. The case comes to the surgeon, as a rule, several months or perhaps years after ankylosis has developed, and the local changes are not only of a higher histological order, but there are present elements foreign to the normal joint, such being found in tuberculosis, gout, gonorrhœal rheumatism, and articular rheumatism.

Hence it follows, clinically as well as theoretically, that ankylosis due to traumatism is more often recovered from, with or without treatment, than that form resulting from disease.

The pathological changes which cause limitation of motion are so many and so variously situated that each case must be especially considered, and very often only a trial of one or more methods of treatment will enable the surgeon

to decide the ultimate result. Among these causes of failure of non-operative treatment may be mentioned:

(1) Bony obstruction by the displacement and subsequent union in faulty position of a fragment of greater or less size, or the overgrowth of callus; or, as sometimes occurs, especially at the knee-joint in children, ankylosis in a flexed position with continuing growth of the ends of the bone may obstruct extension.

(2) Organized new tissue. The result of an injury or disease is at first an effusion of serous, fibrinous, or plastic exudate in or about the joint. It may be limited to the joint-cavity or the periarticular tissues, or it may include both. This material becomes glutinous and gradually changes to fully organized fibrous tissue. The moment the matter becomes organized, we have to deal with a living tissue; and treatment which does not destroy other living tissue will not destroy this new-formed fibrous tissue. Just when the change will take place from an infiltrative, unorganized material to an organized tissue it is impossible to say; in one case the process is slow, in another, rapid.

It is frequently impossible to recognize in a given case the presence or absence of one or both of these conditions, and it is only, perhaps, after a trial of the treatment selected that a proper conclusion can be reached. In many cases, perhaps most, the first condition may be made out by the use of the X-rays, but the latter can only be guessed at.

Besides the above-mentioned changes, it will be understood that there may be others in or about the joint, such as microbic infection, salt deposits, hyperplasia, etc., but the two given are those which are most often overlooked.

In the *ANNALS OF SURGERY* for 1893 (p. 208) I presented an article on the treatment of fibrous ankylosis by electrolysis. This was followed by another paper two years later, published in the *New York Medical Journal*, June 22, 1895), and I now venture to present a third one, because of certain modifications of my ideas, and of the continued good results obtained by treatment of stiff joints with galvanism.

The methods and details of application are fully given in my former articles, and I may here limit myself to saying that the pure galvanic current is used and applied through large home-made sheet-copper electrodes, made to fit the part; between the electrodes and the skin is placed a layer of absorbent cotton, which has been thoroughly wet in a solution of ammonium chloride or sodium chloride. I have recently discarded the Edison-Lalande battery, and am using an ordinary Leclanché battery of Vole type, which I find cleaner, more easily replaced, requiring no greater care, and possibly cheaper for electrolytic purposes.

With regard to the action of electricity in the class of cases under consideration, I believe it to be twofold. First, we have the electrolytic action; that such dissolving action will take place is, I think, undoubted; but it is necessary that the material to be acted on should be unorganized; for the amount of current which can be used must be limited to that which will not disintegrate and destroy living tissue; hence we cannot expect action except in the presence of unorganized tissue. It will act until the period of round-celled infiltration is reached, but not after.

The other method of action is by the heat developed, because of the resistance of the tissues to the passage of the current. This resistance varies with the tissues, and cannot be estimated very well in ohms; but clinically it is considerable, and is manifested by the sensation of heat which the patient experiences, and the reddening of the skin, more or less pronounced, and which may be, with enough current, carried to vesication and even to a considerable burn. This heat, which is generated immediately upon application of the current, extends throughout all of the tissues located between the electrodes. It, no doubt, varies in intensity in different tissues, but it is certainly present, and instantaneously. The heat so developed acts by dilating the vessels, increasing the rapidity and quantity of the flow of blood both to and from the part, and so, through the dilated lymph-channels and

veins, carries away and into the general system, and so to elimination, the disintegrated and liquefied exudate.

This, I believe, from my clinical experience, to be the double action of the galvanic current.

Other methods of treatment are, with one exception, in general, futile. An interesting article, by Dr. W. R. Townsend, on Brisement Forcé (*Medical News*, 1896, p. 120) goes into the subject very thoroughly, and gives the histories of nine cases, with one cure and two accidents, one a probable fracture, the other a rupture of the soft parts. His conclusion is decidedly against its employment, and I think the majority of surgeons agree with him.

The employment of hot air, which has recently been used, seems to be very successful, and I can understand why it should be, for it increases the heat of the part and even of the entire body, and so acts in that much similar to electricity; but it is accompanied by some danger of burning, and there is no electrolytic action such as takes place with the use of electricity. Dr. C. H. Frazier (*ANNALS OF SURGERY*, 1897, p. 456), who has given the results of a very thorough and careful study of the hot-air treatment, mentions having burned several patients superficially. While the burn itself may be simply annoying and do no material damage, its presence precludes a continuation of treatment, and very valuable time is lost. With electricity, I have never occasioned more than a reddening of the skin, which would disappear before the next treatment, two days later, except in two cases of experiment with various electrolytes, and these two cases exhibited simply a few vesicles; the severer, caused by an electrolyte of a very dilute solution of sulphuric acid, prevented applications for about two weeks. The milder, produced by the employment of a solution of lithia salts, showed a few vesicles, which would disappear within two or three days, and did not interfere with treatment.

The histories of cases which Dr. Frazier gives have interested me very much, indeed, and by a comparison with

my published cases, one will find a great similarity of results obtained.

Results of Treatment in Cases due to Injury.—In nearly all cases but a few applications are necessary to effect a great improvement or a cure; and the earlier the treatment is begun the sooner the result. One of the most obstinate cases I have had to treat, and one in which a good result from treatment was anticipated, but difficult to obtain, was the following: Mr. McK. received a backward dislocation of the left knee, and other injuries, three months before being referred to me, by Dr. L. A. Stimson. The patient could not bear his weight on the injured leg; swelling extended to the upper third of the thigh, and there was fluid in the joint; extension was normal; flexion limited to 58 degrees. I made nineteen applications within about forty-five days. He then had 120 degrees of flexion,—a gain of 62 degrees. Thirty degrees were gained between applications, and may be assigned to energetic massage and passive motion; 32 degrees may be attributed directly to galvanism; this being proved by measurements made immediately before and after each application. The thirteenth, fifteenth, and sixteenth application showed no gain; during the others there was an increase of from 1 to 9 degrees. The œdema and fluid in the joint had subsided greatly, and the patient could walk very well, using a cane mainly to prevent an accident, he being a large, heavy man and the weather wintry.

I may mention here, incidentally, that traumatic tenosynovitis, sprains, and injuries of a similar nature react promptly to the galvanic current.

Results of Treatment in Cases due to Disease.—These cases, which are mainly those due to rheumatism, both gonorrhœal and articular, gout, and tuberculosis, come to us so long after ankylosis has set in that the joint changes are established, and not only have we the new-formed fibrous tissue, but, very often, increase in the cell elements of the normal structures, and salt deposits. The treatment will relieve pain, reduce swelling, and increase motion; the latter to a variable

extent, depending on the time treatment is begun. Most cases are benefited, probably by the absorption of the still unorganized material; the improvement begins during the first three or four applications, if at all. The following cases illustrate this: Miss G. had an acute attack of rheumatism at the knee-joint two years before treatment; the first four applications showed an increase in motion of 8 degrees; the next three showed no improvement. Mr. H., supposed gout in the knee of six months' standing; relieved of pain and swelling reduced during the first four applications, the remainder of seven showing no further improvement; there was no increase of motion at any time.

Least is to be expected from the treatment in cases of gout. I treated a case of gouty deposits at the joints of the fingers for some time without the slightest result. This case is one of those mentioned as having been blistered. In this one, and in a case of complete ankylosis of the wrists, due to rheumatism, I used various electrolytes with a view to electrolizing the salt deposits. My experiments were rather interesting, and included solutions of a number of the lithia and other salts, both hands being placed sometimes in like solutions, and sometimes in different ones; one acid, the other alkaline, to increase the electrolytic action. Some of the solutions used were kept saturated with carbonic acid gas, a steady stream of the gas being introduced from below. All of these experiments failed to give the slightest result.

Conclusions.—I believe that all cases of false ankylosis, of traumatic origin, are benefited more or less by the galvanic current; that the sooner treatment is commenced, the sooner, more rapid, and greater the effect; that the effect is more quickly produced than by any other method, except, perhaps, by hot air. That the gain is permanent. I would again call attention to the possibility of bony obstruction unrecognized before treatment is begun.

In cases of disease, the result is uncertain as to increase of motion, but pain is alleviated, and swelling, whether due to infiltration of the soft parts or present as an effusion into

the joint, is reduced. That ankylosis due to gout is least affected of any. That, in cases due to traumatism, for reasons stated, which apply also to cases of disease, the sooner treatment is begun the greater chance there is of success.

All cases, whether of injury or disease, will, if the treatment is to be effectual, show an improvement during the first two or three applications.

It is, I believe, superior to the hot-air treatment, in that there is an electrolytic action, and it is not accompanied by danger of burning the skin, which is not only unfortunate, but precludes further treatment until the burn is healed.

TUBERCULAR CERVICAL LYMPH-NODES.

A STUDY BASED ON THIRTY-SIX CASES SUBMITTED
TO OPERATION.

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TUBERCULOSIS of the cervical lymph-nodes is said to be the most common form of tuberculosis among children. The age of greatest frequency is between the third and tenth years. In older children and adults the disease is not uncommon. In infants it is uncommon.

Anatomical Arrangement of Cervical Lymph-Nodes.—The neck is richly supplied with lymphatics, both superficial and deep. As seen by the surgeon, they are naturally grouped into two main chains, the anterior and posterior. (See Fig. 1.) The anterior chain accompanies the internal jugular vein. The nodes at its top are in close communication with the pharynx, and usually can be palpated when acute pharyngitis or tonsillitis exist. The submental and submaxillary groups communicate with it from in front, and above it there are a few superficial nodes over the parotid, which are very rarely involved in tubercular inflammation. The posterior chain includes both superficial and deep nodes, and runs downward and slightly backward from the region of the mastoid. Near its top, under the sterno-cleido-mastoid muscle, it is in close communication with the anterior chain. The arrangement of lymph-nodes in the posterior chain is not so regular or well defined as in the anterior chain, but when enlarged by tubercular inflammation it frequently has the appearance shown in

Fig. 2. In such instances there are usually several superficial nodes not closely connected with the main chain.

Peculiarities of Tubercular Inflammations in Cervical Lymph-Nodes.—When the cervical nodes are tubercular both chains are usually more or less involved, those near the pharynx are usually larger and in a more advanced stage of inflammation than those below. It is not uncommon to find two or three of the upper nodes in a condition of advanced cheesy degeneration, and the lower parts of both chains less and less inflamed, until at their lower ends no inflammation can be detected.

The type of inflammation is generally slow, but differs greatly in different individuals. Some constitutions seem to have the power of successfully battling with tubercle bacilli, and some bacilli are less virulent than others, hence the lymph-nodes may become walled in by fibrous tissue, and may exist in this condition for years, remaining apparently quiescent or even undergoing calcareous degeneration. These are analogous to the tubercular bronchial lymph-nodes which have been found by many observers in autopsies on patients who, during life, had given no symptoms of tubercular disease. They may, however, suddenly become inflamed and suppurate; and in operations on such cases one finds a matting of fibrous tissue so dense about the nodes that it is difficult to define their boundaries.

On the other hand, some constitutions show little ability to cope with tubercle bacilli, and in them there is a rapid spread of the inflammation from node to node, so that shortly after the first infection there are small nodules very widely disseminated. In operating on such cases one finds the nodes soft and very loosely held by their capsules, with no apparent fibrous tissue about them. On section of the nodes their structure appears pinkish gray, soft, almost homogeneous, with no cheesy or calcareous spots. The tendency of the disease in these cases is to spread rapidly. The axillary nodes soon become involved, and there is a strong tendency to the spread of the disease to other parts of the body.

Between these two types there are all grades of variation.

If left alone the tendency of the nodes is to break down, open through the skin, and discharge their contents. This process is slow; one node after another discharging its contents during months or even years, and leaving unsightly scars.

Sometimes the tubercular inflammation extends to other organs. Although it is often stated that general or pulmonary tuberculosis seldom result from tuberculosis of the cervical lymph-nodes, the reports of various observers indicate that such infection does occur in a large proportion of cases. The proportion is probably larger than the reports indicate, as the symptoms may occur after the making of the report. Clinicians of large experience with phthisis state that it is not uncommon to find phthisical patients who in their childhood had had diseased lymph-nodes.

Van Noorden¹ reported the cases with tubercular cervical lymph-nodes which were treated in the Tübingen clinic from 1872-1888. He found that of 149 cases, whose history was traced for three years or more, twenty-eight had died from general tuberculosis, fourteen others had pulmonary tuberculosis, but were alive at the time of the report.

Haehl,² who followed the histories of 106 patients operated upon for "hyperplastic" and tubercular cervical lymph-nodes from 1880-1890, reported that 12 per cent. of the former and 23 per cent. of the latter had died of tuberculosis.

Karewski,³ who with Wohlgemuth had followed in a similar way, 127 of the children treated in a Berlin clinic, one to six years previously, reported that only three had died of tuberculosis. He quoted the reports of Bouilly,⁴ 10 per cent.; Bruhn,⁵ 10 per cent.; Grünfeld,⁶ 10 per cent.; Scheyer,⁷ 11½ per cent.

Etiology.—The most common point of infection is believed to be the pharynx, which is so prone to inflammation in children as shown by pharyngeal adenoids, hypertrophied tonsils, chronic pharyngitis, etc.

Nicoll⁸ has investigated this with great care. He

studied 500 cases with reference to their etiology, and found that the enlargement was usually first noticed at the upper

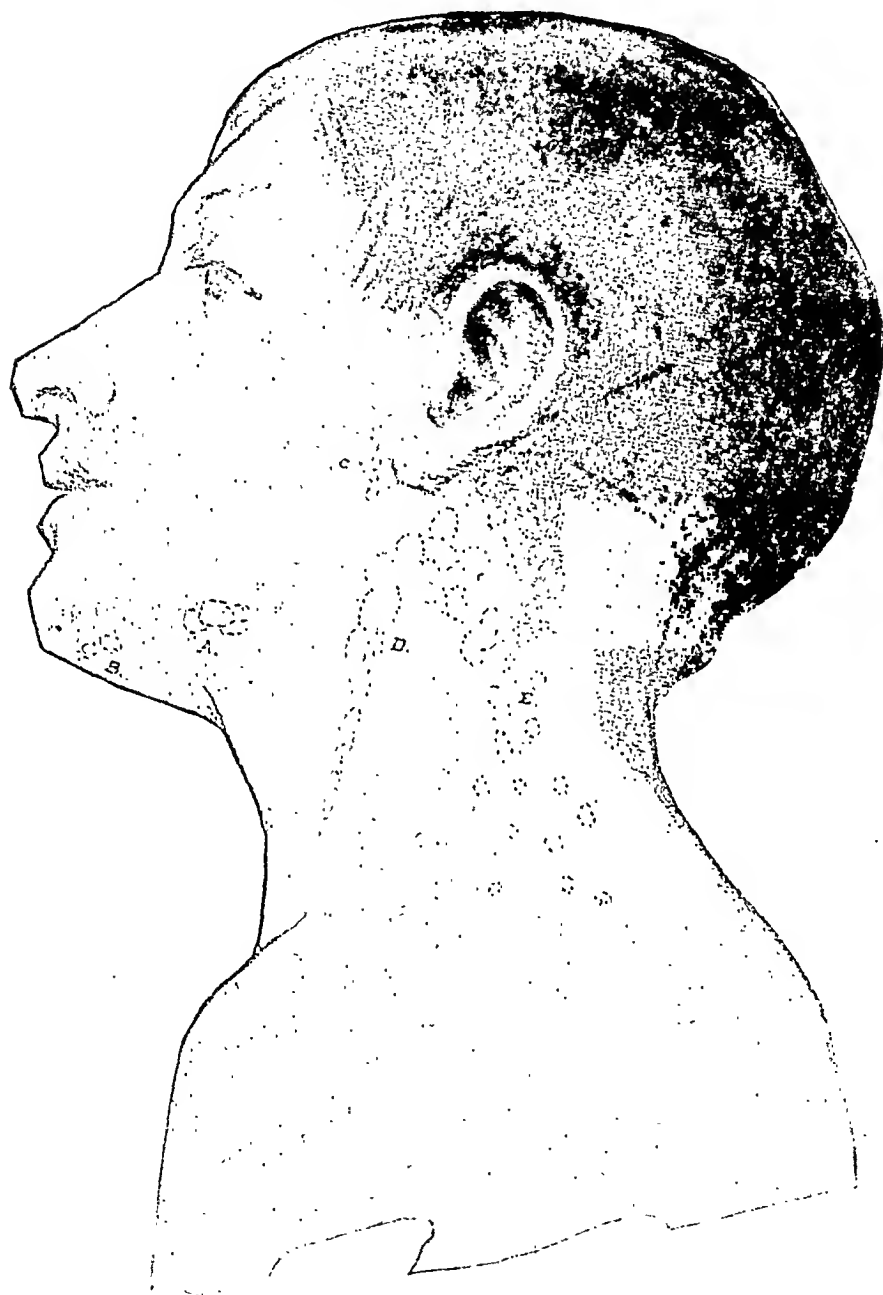


FIG. 1.—Diagram showing the general arrangement of the cervical lymph nodes. A, submaxillary group; B, submental group; C, parotid group; F, mastoid group; D, anterior chain; E, posterior chain.

part of the carotid sheath, near the bifurcation; that the deepest nodes involved were post-pharyngeal; that in 70

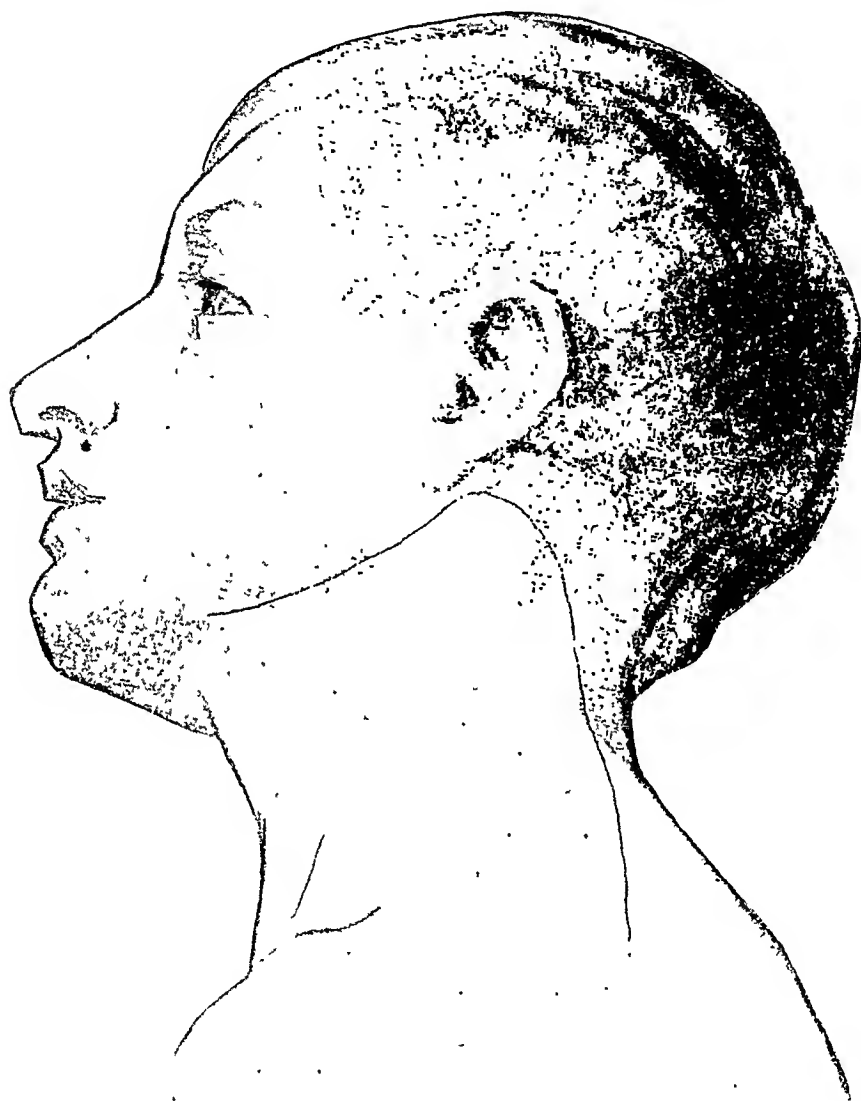


FIG. 2.—Lines of incision for removal of anterior and posterior chains and submaxillary group of lymph-nodes.

per cent. of the cases the disease was bilateral, and that the swelling would come and go with fresh attacks of catarrh. He believed that the swelling was at first a simple hypertrophy, and that the tubercular inflammation was added at a later period, but he found tubercle bacilli in small nodes recently involved, and hence concluded that the process was often tubercular from the start.

He also found that a considerable number of tonsils and pharyngeal adenoids, which he removed, contained tubercle bacilli embedded in the tissues among the lymphoid cells side by side with other organisms, even when there was no gross appearance of tuberculosis. He also calls attention to the reports of other observers. Dinochowski⁹ found tubercle bacilli in great numbers in tonsils of consumptives which showed no clinical appearance of tubercular inflammation. Dieulafoy¹⁰ found tubercle bacilli in tonsils and adenoids of persons not suffering from tuberculosis. Lermoyen found similar conditions. Krückmann¹¹ states that tuberculosis of tonsils without naked-eye appearance is common, and is the source of tuberculosis of neck glands, and questions whether all hypertrophied tonsils should not be removed.

Stark¹² considers carious teeth the most common source of infection, and in two instances has found tubercle bacilli in the carious teeth and in the lymphatics leading from them. In such instances, however, the submaxillary nodes should be the first ones infected, and clinically this does not often occur.

Milton,¹³ with an experience of nearly 1000 cases in Egypt, considers vermin in the head a most important exciting cause; he has seldom seen the disease in boys and men who shave the head from time to time, but has found it very common in girls who, according to the custom of the country, abstain from washing.

Eczema, rhinitis, otitis, or any inflammation about the head, may occasion enlarged cervical lymph-nodes, and they may become tubercular; but those which are in close communication with the pharynx are usually the first ones af-

fect, and it is fair to believe that the pharynx is the most common site of infection.

Diagnosis.—The diagnosis of this condition is not always easy. Inflammations of the cervical lymph-nodes frequently follow the exanthemata, pharyngitis, tonsillitis, diseases of the scalp, and other infections. These ordinarily run an acute



FIG. 3.—Photograph of posterior chain of tubercular cervical lymph-nodes taken from a child two-and-a-half years old. The upper one showed advanced tubercular infiltration with formation of giant cells and extensive cheesy degeneration. The middle one showed early stage of tuberculous change, areas of cell-infiltration with giant cells and one small area of cheesy degeneration. The lowest node showed on section one small tubercle with cheesy centre.

course; when the deep nodes are involved, a phlegmon results which is easily distinguished from tubercular inflammation; when the superficial nodes are involved, small abscesses may result or an inflammation which soon subsides. Hence, if a case can be kept under observation for a time, the diag-

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nosis between tubercular inflammation and acute infection by pyogenic bacteria is usually made with ease. There are, however, a few instances of chronic enlargement of the lymph-nodes which are most difficult of diagnosis,—cases in whom the nodes are not greatly enlarged, nor is there any appreciable changes in their size from month to month and little or no pain. A large proportion of such cases is without doubt tubercular; in some there is a slight inflammation somewhere about the head which is the exciting cause. Volland¹⁴ estimates that 68 per cent. of all enlarged cervical lymph-nodes are tubercular. Nicoll estimates the number as 80 per cent.

The use of tuberculin has been suggested to determine whether suspected cases are tubercular or not. Otis,¹⁵ of Boston, has found that the reaction from the injection of tuberculin corresponded very closely to clinical appearances in cases of enlarged lymph-nodes. Trudeau,¹⁶ Northrup,¹⁷ and other observers, have found that this test is of considerable value, although not to be relied upon implicitly. The enlargement, which is due to cancerous or syphilitic disease, can usually be diagnosticated by the accompanying conditions. Lympho-sarcomata seldom exist in the neck alone, but are disseminated through other parts of the body.

Treatment.—The condition of the general health is important and should be attended to no matter what else we do. Tonic and hygienic measures may be employed until the diagnosis is established, or until it can be determined whether the disease is advancing or not. It is to be remembered that one can remove the inflamed lymph-nodes in a short time without much danger and without much suffering, and most cases are best treated in this way. There are numerous reports of long series of operations without fatality or serious accident. The advantages of operation as compared with those of expectant treatment, or the incision of separate nodes, as they become softened, are that we substitute a rapid removal of the nodes for a process of slow discharge, which consumes years, we diminish the likelihood of general tubercular infection, and we leave scars which are far less

deforming than those which result from the slow discharge without operation. In the operation itself one must, at first, be surprised to find how many more nodes are involved than would be supposed from the appearance of the neck. Large numbers of diseased nodes will usually be found where prior to operation only a very few could be palpated, and the operator should aim at their complete removal. Complete operations are preferable to those which remove only a few of the largest nodes.

Technique of Operation.—The incision should be so planned as, first, to give a thorough exposure of the field of operation; second, to leave a scar which will be as little noticeable as possible. Various incisions have been used. A common one is to make the first incision along the line of the carotid, and make as many side cuts from this or parallel cuts as may be needed. Senn advocates an S-shaped incision, which runs under the border of the jaw going back to the hair-line, then coming forward across the neck to the lower part of the carotid sheath, and then curving back across the shoulder. Both of these methods give excellent exposures of the desired field of operation, but both leave scars in the front part of the neck which show very plainly.

Longitudinal scars in the neck usually stretch; transverse scars seldom stretch; hence Kocher¹⁸ advocates transverse incisions there wherever the suitable access can thus be gained to the operative field. Where there is extensive disease of the lymph-nodes, however, it is impossible to reach them satisfactorily through transverse incisions without making them so long or so numerous as to nullify the advantages which are claimed for them.

Dollinger¹⁹ advocates an incision made just back of the hair-line, but through such an incision it is most difficult to get access to the anterior chain of nodes.

The writer has used the following incision nine times with very satisfactory results. (See Fig. 2.) It is carried transversely under the border of the lower jaw and backward as far as the mastoid process and there deflected downward along the hair-border, the hair having previously been shaved.

It extends as far forward and as far downward as the extent of the disease renders desirable. This skin-flap is then dissected and turned forward and downward. This exposes the entire posterior chain, and the anterior chain about two-thirds of its distance towards the clavicle, also the submaxillary



FIG. 4.—Photograph taken two months after the removal of large numbers of tubercular cervical lymph-nodes from both anterior and posterior chains. Patient so posed as to bring the cicatrix into the most prominent position.

group and, if necessary, the submental group. A separate incision may be made over the lower part of the anterior chain, if necessary; it is not prominent as it lies below the collar-line. After the healing, the scar from this operation hardly shows. The transverse part is under the border of the

jaw and is less noticeable on account of the slight shadow which naturally exists there, and there is little tendency to stretch; the vertical part is partially hidden by the hair and the collar, and is situated so far back that it is only slightly noticeable. Photograph (Fig. 4) shows the appearance of the



FIG. 5.—Same patient as Fig. 4, showing that the cicatrix is not noticeable from the front or from a view a little to one side.

cicatrix when the patient is so posed as to make it most evident, and Fig. 5 shows that it is invisible from a front or slightly side view. When only a few nodes are inflamed, of course a small incision may be used so situated as to render their removal possible.

The sterno-cleido-mastoid muscle should be cut in many instances in order to gain good access to the nodes which lie beneath it. Its ends should afterwards be sutured with cat-gut. I have never seen any ill effect from this. Milton reports two cases of torticollis following division of this muscle. Such a result must be very rare, so rare that one should not hesitate in cutting the muscle when a thorough operation demands it.

The internal jugular vein may occasionally be cut or torn so as to need ligation, a procedure which is accompanied with little danger.

Rohrbach²⁰ has collected histories of ninety-one cases in whom this vein has been ligated without untoward result. One case has been reported in whom there was cerebral softening, but in this case the corresponding vein of the other side was almost occluded.

The nerves which lie in the field of operation need not be injured so as to occasion deformity. In the posterior part of the incision branches of the cervical plexus are encountered, the superficial ones may be cut when necessary, the deep ones need not be injured. The spinal accessory in the sterno-cleido-mastoid muscle cannot always be easily preserved, and may be cut without ill effect. Milton¹³ has cut it in more than fifty cases, and has carefully looked for symptoms, but has not found them. Some of the lower filaments of the facial nerve may be cut in the incision, which runs just below the border of the jaw, and a slight temporary drooping of the lower lip near the angle of the mouth may result. This is hardly to be noticed, and has subsided within a few days or weeks in all the cases where I have seen it, excepting two who had been operated upon by other surgeons in another country, in whom it was prominent. The scars in these cases indicated that there had been abscesses with prolonged sup-puration and incisions which extended above the border of the jaw.

Effect of Extensive Removal of Lymphatics.—In doing the thorough operation one removes the greater part of the lym-

phatics of one or both sides of the neck, and may fairly ask what the effect of so extensive a removal of lymphatics will be.

Apparently the patient suffers no ill effect. Probably the functional power of the diseased lymph-nodes has been already destroyed by the disease: lymphatic anastomosis is very rich, and new lymph-channels are easily formed, and hence a compensatory lymph circulation is probably soon established. The thorough operation has been very extensively done in Europe and in this country for many years, and I have failed to find records of cases who suffered from the interference with the lymphatic circulation, excepting rare instances of slight œdema.

Riedel²¹ has reported three cases of severe persistent œdema, one in the arm and two in the leg, after the removal of lymphatics, but one may fairly question whether cicatricial pressure on the blood-vessels may not have been a factor in this œdema. Professor Bayer,²² of Prague, in replying to Riedel, has found, by a remarkably careful histological study, that there are clefts and passages in the fatty tissue which may be considered as preformed lymph-channels, and that new lymphatics are quickly formed when the old ones are occluded.

Köppe²³ ligated the lymph-channels leading to the nodes in dogs' necks first on one side, and fourteen to twenty-six days later on the other side, and found that in less than two months the function was restored.

Results of Operation.—The final results of this operation are difficult to obtain as the patients would have to be followed for a longer time than is practicable. We have, however, the reports of many carefully conducted studies on the subject. Wohlgemuth's²⁴ report of cases under ten years of age, treated in Berlin, one to six years previously, are as follows:

Total number of cases	297
Not treated by operation	130
Treated by operation	167

As a sequela of operation, there was no fatality; no

miliary tuberculosis; no septicæmia; no long illness. The patients walked soon. One hundred and twenty-seven of the cases were traced, forty-six of whom had not been treated by operation; thirty-six of whom had been treated by incision and scraping; forty-five of whom had been treated by total extirpation of the nodes. The conditions at the time of last observation are tabulated as follows:

	Apparently Cured.	Improved.	Not Improved.
Cases not-operated upon	24 per cent.	37 per cent.	39 per cent.
“ treated by excision and scraping .	63.9 “	27 “	8.3 “
“ “ by extirpation of diseased nodes	70.5 “	22.8 “	6.4 “

Haehl,² of Strasburg, made a study of the results of the extirpation of “hyperplastic” and tubercular cervical lymphomata, 1880–1890.

The total number of cases who are recorded as tubercular and whose after-history could be followed was 82.

The results were: Permanent healing, 68 per cent.; recurrence, 4 per cent.; died of tuberculosis, 23 per cent.; living with general tuberculosis, 5 per cent.

Van Noorden¹ reported from the Tübingen clinic 149 cases of tuberculosis of the cervical lymph-nodes, whose operations had preceded the report by three years or more, with the following result: No local recurrence, 62.4 per cent.; local recurrence, 37.6 per cent.; no local recurrences came more than six years after the operation. Died of tuberculosis, 18 per cent.; living but with phthisis, 9 per cent.

If we group these three reports, deducting those cases who died of diseases which were not tubercular, we have the following table of results from patients who were treated by operation more or less complete, and whose after-history was followed in most instances for several years:

Total number of cases	309
Apparently cured	202,—65.4 per cent.
Living, but with local or general tuberculosis .	57,—18.4 “
Died of tuberculosis	50,—16.2 “

The writer's cases, upon which this paper is based, number thirty-six, operated upon within the last five years by operations which were as complete as was practicable. The effort was always made to remove all the affected nodes, but in a few cases, in poorly nourished children, where abscesses existed it was not deemed wise to do as extensive operations as would otherwise have been done.

The cases have been followed with much care, but most of them have been operated upon within the last two years; two have died of intercurrent disease and some others could not be traced, hence there are only eleven who have been followed for more than two years; of whom six are apparently cured, three have small nodules which seem to be quiescent, and two have disseminated nodules. Rather than attempt to draw statistical conclusions from cases so few in number and so recently operated upon, it seems far better to reserve such a study for a later time, and now to call attention to the immediate effects of the operation and to the differences in prognosis which seem to belong to the different types of the disease.

There were no deaths, and the patients were all decidedly benefited by operation. The wounds healed within periods which varied according to the conditions of the nodes and the tissues about them. When the nodes are not broken down, primary union may be expected, for instance, from Case VII more than fifty small nodes were removed, and he left the hospital in eleven days, with wounds healed. Primary union may sometimes be obtained in cases where the nodes have broken down, for instance, from Case XXVII large masses of lymphomata were removed, many of them containing much pus or more properly liquid tubercular detritus. The small drain which was inserted at the time of operation was removed in two days, and healing promptly followed. At a later time, however, a small sinus opened at the lower end of the incision, and remained in a sluggish condition with slight discharge for several weeks. Where there are broken-down nodes we may expect more or less delay in the healing.

The prognosis among these cases seemed to differ greatly with the type of the disease. It was best among those patients who had been able to hold the disease in check for a number of years, and in whom only a few inflamed nodes could be found, and these well shut in by fibrous tissue. Case XVII illustrates this:

Mrs. B., aged twenty-eight, a patient of good physique, without tubercular family history, noticed first, about eight years ago, a few nodules in the neck. About a year later an attempt was made, in another city, to incise or excise them under cocaine anæsthesia, but on account of pain a very imperfect operation was done, and there was a discharging wound for four months. After this healed enlarged nodes could still be felt, but they remained for five years without noticeable change; then they became enlarged and painful, and were removed by operation,—about six of them,—some of them showing areas of necrosis. All of them firmly shut in by fibrous tissue. Now, two years after operation, no enlarged nodes can be detected, and the patient is apparently perfectly well.

The prognosis is much less favorable in those patients where there has been a more rapid general involvement of the lymphatics, the formation of abscesses, and a tendency to spread to neighboring lymphatics. Case XVIII illustrates this:

A poorly nourished, anæmic child, who entered St. Mary's Hospital for Children, December 28, 1896. For two years she had had enlarged lymph-nodes on the left side of the neck, some of which had opened spontaneously. On admission there was a small cold abscess over middle of left sterno-cleido-mastoid muscle. Numerous enlarged nodes could be also felt on left side of neck and a few smaller ones on right side. On January 7, 1897, the abscess was opened and posterior chain of nodes excised. March 1, anterior chain enucleated; May 26, sent to country with sinus still discharging; August 2, sinus curetted and submental nodes removed; September 7, left hospital, wound healed; November 21, 1898, examined. Left side of neck healed

and free from lymphomata, excepting a small bunch just above the clavicle. Right side very numerous lymphomata, opening through the skin in three places. Both axillæ contain bunches of lymphomata. Lungs do not give physical signs of tuberculosis. General condition of the child bad.

Between the two types which are represented by these patients there are various grades of severity of the disease.

The results of the operation warrant one in advocating the removal of tubercular cervical lymphomata, excepting in patients whose general condition unfits them for such a procedure. The operator should endeavor to remove all the diseased lymph-nodes.

The patient should be kept under observation after operation, and other diseased nodes should be removed if they appear.

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DECORTICATION OF THE TONGUE IN THE TREATMENT OF LINGUAL PSORIASIS.

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It is chiefly to the writings of English observers that we are indebted for much of our knowledge of the relations of certain chronic affections of the lingual mucosa to malignant disease. Beginning with Plombe, who, in 1837, first described true hypertrophy of the lingual papillæ, since called ichthyosis by Mr. Hulke, a number of writers, among whom might be mentioned Hulke, Clarke, Hutchison, Butlin, and most prominently Morris, have from time to time called attention to the frequent conversion of what has been variously called lingual psoriasis, ichthyosis, and plaque opaline, into carcinoma. An important step in advance was made when, at the International Congress of 1881, Schwimmer was sustained by every speaker in the view that many of these affections were independent of syphilis as an etiological factor. It is certain that even to-day cases are treated for a long time as specific without reason. The same may be said of the long-continued use of arsenic on the presumed basis of a relation between lingual and cutaneous psoriasis. I have seen but one case in which lingual and cutaneous psoriasis co-existed.

Quite recently there was referred to me by Dr. Cann, of Dayton, the case of a young man of thirty-three, who for three years had a growing ichthyotic lingual patch. For many years he had been the subject of attacks of cutaneous

psoriasis. At the time of examination a few punctate spots were present on the forehead and on the breast. The entire left side of the tongue to the line of the circumvallate papillæ, but not involving the anterior half-inch, was occupied by a dense, leucomatous patch. He had taken 500 grains of potassium iodide daily for several months without benefit. He had also taken proportionately large doses of arsenic. He refused to submit to operation.

A pathological division of cases of leucoma into two groups appears to be warranted. In the one group, the patch is little, if any, elevated, of pearly appearance, and perfectly smooth. At times irregular fissures are present. A microscopic examination shows an atrophy of the papillæ with small-celled infiltration of the deeper layers of the mucosa, with great thickening of the epithelium. In the other group of rarer cases the hypertrophy of the papillæ is more or less marked and, as a rule, made manifest to the naked eye.

It is particularly in this class of cases that the tendency towards the development of malignant disease is most marked. In both groups of cases the lesions present a permanency in regard to localization on the dorsum of the tongue. In cases of long standing the cheeks and gingival reflections become involved. There is another class of cases, and these are usually of syphilitic origin, in which the lesions shift from place to place, and show little tendency to remain fixed for any considerable length of time. The lesions here are ordinarily quite superficial, and for this reason are most amenable to topical applications.

On the other hand, the prognosis as to cure of the more permanent leucomata of the tongue is unfavorable in the extreme. It is almost certain that the use of strong caustics enhances the inherent dangers of the condition. The question is pertinent, whether it is better to leave the plaques as a potential element of danger to life or to remove them. It is a matter of every-day experience that superficial wounds of the tongue are very quickly recovered from. The danger of wound-infection is not very great. It has, therefore, seemed

to me that, notwithstanding the teachings of most writers upon this subject, leucomata of the tongue that are fixed in position, and have continued for a year or more unbenefited by milder local applications, or systemic treatment, including the regulation of diet, are fit objects for surgical intervention. This intervention should take the form of excision. I do not know that the term decortication has been applied for this procedure. It has suggested itself to me as a proper name for the operation of removing as much of the cortex of the tongue as is necessary for the radical cure of leukoplakia. I have for a number of years practised this in cases without an adverse result, and without recurrence of the patch. The most striking case that has come under my observation is the following:

J. L., aged forty-four, widower, was referred to me by Dr. I. E. Groves, of Uhrichsville, in the spring of 1896. The family history is good. He has always been in excellent health. Never has had any venereal disease. He has been a moderate smoker since his eighteenth year. Ten or twelve years ago, the patient does not remember just when, there appeared a whitish patch on the left side of the dorsum of the tongue, between the edge and the midline. Its growth was gradual and very slow until its present dimensions were reached. Suffering has never been very acute, although some inconvenience follows the ingestion of anything very hot or acid. Occasionally slight pain is felt in the left ear, and at times there is a greatly increased flow of saliva and slight difficulty in mastication. There never has been any bleeding or extensive shedding of the epithelium.

The patient is a robust adult, slightly below the middle height. With the exception of the morbid condition of the tongue he is perfectly well. On the left half of the dorsum there is an elongated, creamy-white, oval patch two and one-half inches in length, and one and one-half inches in width. In its widest part it crosses the midline half an inch. The patch extends from within one-half inch of the tip to the line of the circumvallate papillæ. It is distinctly differentiable from the normal mucosa by a sharply defined outline. It stands in relief. While it is difficult to measure the elevation of the patch, it may be esti-

lated to project from one-eighth to one-third of an inch over the general surface of the tongue. Whereas its surface presents at first glance a uniformly white appearance as of solidly massed epithelium, closer inspection reveals individual groups of papillæ greatly enlarged. This is especially noticeable in spots where the epithelial covering is thin, or altogether wanting. When the saliva is allowed to accumulate in the mouth, the surface of the patch presents the appearance, in miniature, of a well-washed sheep pelt, the tuft-like prolongations floating hither and thither in the currents. (Figure.) Opposite the last molar tooth an induration can be felt. Decortication of the tongue was advised.

In October, 1898, under morphia-chloroform narcosis, the mouth being kept open by a gag, the tongue was drawn out by



Papillary ichthyosis of the tongue.

a suture as for the Whitehead operation of excision. With a knife an incision was carried through the normal mucosa around the entire circumference of the patch. With curved scissors the entire portion of the diseased mucosa and the underlying muscular bundles were excised. The bleeding was rather profuse, but altogether capillary, and easily controlled by hot water and pressure. The entire surface was then powdered with potassic permanganate. The recovery was altogether uneventful. The granulation process was rapidly established, and within a little over three weeks the entire denuded surface was covered by epithelium.

The patient was heard from over two years after the operation. He continues well, and would not know from the present

condition that more than half of the cortex of his tongue had been removed.

The examination of the specimen was made by Dr. Freiberg, who submitted the following report:

"The specimen under examination is taken from a vertical cut through the tongue, at the posterior border of the new growth, and embracing a portion of this as well as of the contiguous and apparently natural tongue structure. The following are the appearances seen in the sections after hardening in formalin and staining with picro-lithiocarmin.

"Under low power there is seen to be a great overgrowth of the epithelial layer of the mucous membrane; an overgrowth which appears to be simply an exaggeration of the structures of the natural filiform papillæ, a row of which may be seen in the same section. This overgrowth, occurring altogether towards the free surface, has resulted in the formation of long filiform projections, sometimes divided near their free extremities; they are of stratified epithelium, similar in every respect to that of the adjacent normal filiform papillæ, with the exception of the stratum corneum, which is usually thick along the sides of the projections, but especially well marked at their pointed ends where it is collected into a rather long horny cap.

"Nearly all of the projections above described are channelled through by one or, in some instances, two distinct canals which a higher power shows to be lined with endothelial cells, and often containing blood; they may therefore be considered capillary blood-vessels. In some of these papillæ the vessel is considerably dilated at its extremity, the bulbous dilatation having likewise an endothelial lining and being filled with blood.

"The most careful examination fails to reveal any down-growth of epithelium into the tongue substance or beyond the basement limit of the mucous membrane. There is therefore no evidence whatever of malignancy, and from the above appearances the diagnosis of ichthyosis papillaris is confirmed."

Two additional cases of papillary ichthyosis have come under my observation, and were successfully treated by decortication. One occurred in the case of a girl of three, who was treated in the dispensary of the Medical College of Ohio nine years ago. It involved the tongue in the region of the

left anterior circumvallate papillæ. From the age of the child, it was to be inferred that the disease was in this case congenital. The patch of grayish color presented a shaggy appearance, and from near its centre there projected a warty growth fully one-fourth of an inch above the level of the tongue. This patch of the lesion presented the usual appearance of the lingual papilloma, which is not of very infrequent occurrence. Under chloroform anæsthesia the entire patch was removed with curved scissors. The immediate result was satisfactory. Of the subsequent history of the case nothing is known.

The third case was that of a youth of eighteen, who was a patient of the Avondale Hospital in 1890. He presented a papillary ichthyotic patch on the dorsum of the tongue as large as a silver quarter, which was removed by decortication December 1, 1890. The patient left the hospital one week thereafter. The process of repair by granulation was complete at the end of ten days. This patient was seen fully five years after the operation, and it was impossible to determine by inspection or touch any scar tissue left by decortication.

The ease with which more or less extensive removals of the mucosa of the tongue was practised in these cases, the harmlessness of the procedure, and the permanence of the relief afforded have led me to adopt the measure in the more common varieties of lingual leucoma, although the tendency in them to malignancy is less marked. While these leucomatous patches are, as a rule, but little painful, their presence often causes a mental anxiety unwarranted by the slight gravity of the disease. The inefficiency of local and systematic treatment, though continued for months, adds to the perturbation of mind. Four or five cases of this nature have come within my observation, and were permanently relieved by excision of the patches. When they are small, as they are in the beginning, cocaine anæsthesia answers all purposes.

With one exception the cases were in men of middle life. The exceptional case occurred in a young man of twenty,

who was an excessive smoker of cigarettes. In none of my cases were the cheeks involved. It is questionable whether, in the very extensive cases of many years' standing, in which the lingual and buccal mucosa are very widely covered with leucomatous patches, any operative interference is warranted.

While, doubtless, warty growths of the tongue have for many years been excised, and ichthyotic patches occasionally removed, I am not aware that their removal by decortication as a regular practice has hitherto been suggested. In a few recorded cases (Atkinson and Coppinger) English surgeons have resorted to the seemingly unnecessary mutilation of the total excision of the tongue. An illustrated case, reported in the London *Illustrated Medical News*, very closely resembles the illustration accompanying this report. By the use of the galvano-cautery, E. Fletcher Ingalls has achieved some excellent results. The objection to its use is that it leaves an eschar which requires much time for its removal. Furthermore, surgeons have long ago discarded all forms of the actual cautery in the surgery of the tongue, since it predisposes to septic infection and to secondary hæmorrhage. Lingual leucomata that are not of luetic origin are comparatively rare in our country. This is shown by the fact that I have been unable to find any notable American contributions to the literature of the subject, except the valuable articles of Ingalls and Weir. Although two of the cases above reported were operated on nearly ten years ago, I refrained from their publication until a more exemplary case should come under my observation. While seven or eight cases of leucoplakia successfully and permanently relieved by decortication do not represent a large clinical array, I believe myself justified in presenting the method as a treatment to be adopted when other means have failed.

CONGENITAL DEFORMITY DUE TO MALPOSITION OF THE SCAPULA.

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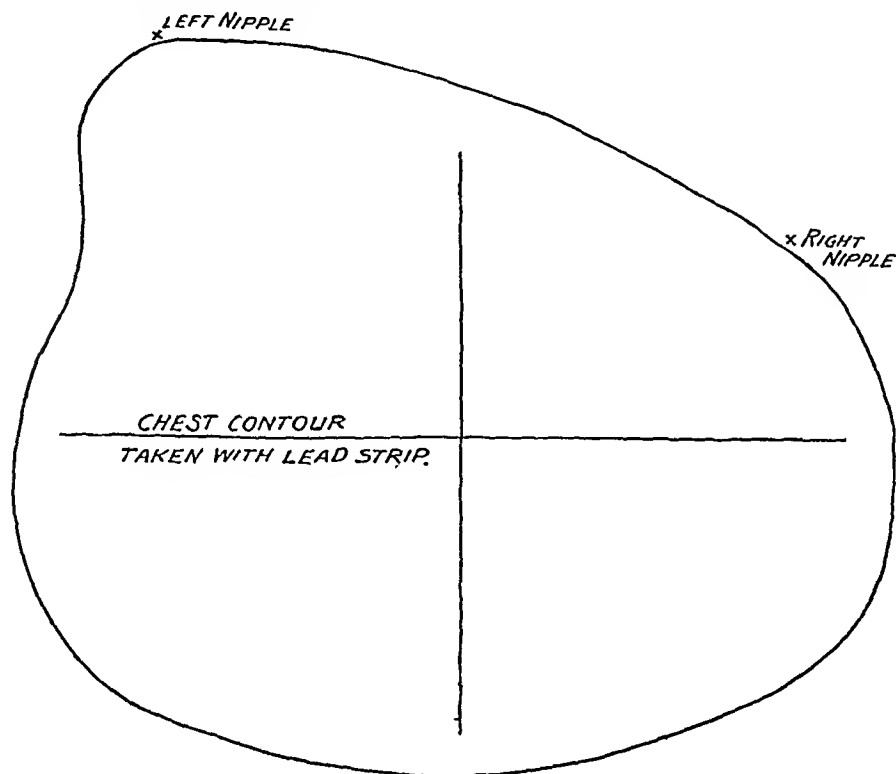
ALTHOUGH the following case is one of rarity and of considerable interest, I have hesitated somewhat in presenting this report, because of my inability to secure a photograph of the patient to make it complete. While the first report of the condition, as far as I have been able to ascertain, was made in this country, it was very brief, and has to this time not been followed by others in the English language.

Margaret Emily W., aged four and one-half years, is to all external appearance a healthy child, and tall for her age. Her family history presents no points of interest in this connection. She is the younger of two children, the other being a boy perfectly developed in every regard. Since birth her mother has observed the abnormal appearance of the spine and region of the left shoulder, and not long after this weakness and incomplete development of the left leg became manifest. Professional advice was sought chiefly on account of the last-named condition.

The mother is unaware of anything abnormal or unusual about her pregnancy or labor, except that it was more tedious than her first. A communication from Dr. Shepherd, of Glendale, Ohio, who attended her in confinement, informed me that there was nothing uncommon about the labor. He has no recollection of scanty liquor amnii nor of unusual position of the child.

The examination of the patient shows the right shoulder-blade to be normally prominent and in proper relation to humerus and clavicle; the left scapula, on the other hand, is not prominent upon inspection, at least regarding its lower two-

thirds. Between the root of the neck and the left shoulder, however, there is to be seen a marked prominence, especially well marked behind, but also visible in front, and having the effect of making the neck appear rather shorter and thicker on the left side. Palpation shows that, while the body of the left scapula is present, it is much smaller than the right in all of its diameters. It is easy to establish that the prominence at the root of the neck is bony and that it belongs to the scapula. It can, in fact, be well recognized as the superior angle of this bone. Immediately beneath it can be felt the spine, though much less prominent than



that of the opposite shoulder-blade. The length of the left scapula from superior angle to inferior angle is four and one-half centimetres, the right measuring six centimetres, between the corresponding points. The long axis of the left scapula seems tilted somewhat, approaching the horizontal, so that the inferior angle is approximated to the vertebral column. Although it is difficult to make a truly accurate measurement, it is evident that the superior angle on the left side is about five centimetres higher than the right.

The prominence of the coracoid process, easily felt internal to the humeral head, on the right side, is but faintly distinguished upon the left. The mobility of the left shoulder is very free, save that the arm cannot be raised above an angle of 100 degrees from the vertical. In addition, there is noticed a right dorso-convex scoliosis with a slight compensatory curve in the lumbar region. There is very little rotation of the spine, and the curves are not entirely obliterated by the suspension of the patient.

The shape of the chest, also, is seen to be abnormal. (See diagram.) There is marked projection forward, corresponding to the left mammilla, and a decided flatness at the same place on the right side. This is well shown in the tracing of the chest contour, which was taken at the mammillary level. There is absolutely no asymmetry of the face or head.

The left leg, while but very little shorter than the right, is of much less circumference, and the left foot is considerably shorter than its fellow. While the child can execute all the movements of the foot and leg, the ankle is evidently weak, and in the act of walking, as well as in standing, tends to assume a position of slight varus. The child was so unruly that it was out of the question to secure a photograph; indeed, it was with great difficulty that I secured the few measurements given above.

The examination, whose details I have just recorded, has convinced me that the deformity of the left shoulder region has as its anatomical basis a congenital malposition of the scapula. This condition, whose occurrence must be of great rarity, was described by Sprengel¹ in 1891, who reported four cases which came under his observation. Although he was unable to find reports of similar cases prior to his own, he was nevertheless preceded by McBurney, who presented a case to the New York Surgical Society in 1888, occurring in the person of a young woman of twenty-three years. In the discussion, Dr. Sands reported a similar case. Inasmuch as these two cases were the very first reported, at least as far as I have been able to ascertain, I have appended the following account of them, taken from the *New York Medical Journal* of 1888, Vol. xlvii, p. 582.

"Dr. McBurney presented a young woman, aged twenty-three years, who has a peculiar deformity of the right shoulder, which was said to have existed since birth. The scapula was so placed that its lower angle pointed directly towards the spine, the superior angle projecting high above the centre of the clavicle. The clavicle on this side was at least an inch and a half longer than the left one, but articulated normally with the sternum, and also completely with the acromial process. The speaker thought the deformity might have been caused by some accident occurring at the time of birth. The movements of the humerus were good, but the arm could not be raised beyond a right angle.

"In reply to the president, Dr. McBurney said the coracoid process could be felt.

"Dr. Sands said that he had seen a similar condition in a child two years before; he was sure that it had not been due to any injury received at birth. There had been no disability, but the scapula had been elevated as much as in the present case, so as to cause a conspicuous deformity in the neck. He had assisted Dr. Shaffer in dividing the trapezius and levator anguli scapulæ muscles, but no benefit had resulted from the operation. Subsequently the speaker had removed the portion of the scapula above the line of the spine; in addition to the elevation of the entire bone, its upper edge was curled forward. The child had been greatly benefited by the operation, and there seemed to be no reason why a similar procedure would not be successful in the case of Dr. McBurney's patient. The speaker had been unable to find a report of a similar case."

A recent communication from Dr. McBurney informs me that he is not in possession of further details regarding his case, and, in addition, that he has not seen a second one. Dr. Shaffer also has seen but one case; the one reported by Sands, and mentioned in the society's report. Since the presentation of McBurney's case, in 1888, there have been reported no less than twenty cases of congenital malposition upward of the scapula; these are exclusive of the two cases above mentioned. A critical examination of these case-reports brings one to the conclusion that there are certain striking points of resemblance in most of the cases. Aside from the projection of the superior angle of the scapula above

the clavicle, there is noted in the greater number of instances a tilting of the long axis of the scapula, so that the inferior angle approaches the median line. In the majority of cases, also, a lateral curvature of the spine has been described; in some cases the convexity has been homologous, and in others not. Disturbance of function appears as a feature in more than half the cases, consisting, for the most part, of impairment, to greater or less degree, of the power to elevate the arm above the horizontal, or, in other words, above that level to which the extremity can be raised without movement on the part of the scapula. In several instances no mention is made of impaired function, while in four it is distinctly denied. The left side has been much more frequently concerned than the right, while one case of bilateral malposition upward has been described by Milo. Congenital abnormalities of other parts have been observed with a certain frequency; especially is this true of the face and head, and consisting of asymmetry or the so-called cranial scoliosis. I have found no description of chest deformity similar to the one in my case, save possibly one case of Kirmisson's, in which a difference in the volume of the two sides of the chest is pointed out.

The etiology of this peculiar and very unusual condition is certainly the most interesting question involved in its consideration, inasmuch as it causes neither very great functional impairment nor very considerable deformity, as a rule. It is a fact that a very large proportion of the reported cases came under observation because of some condition secondary to the malposition of the scapula, such as lateral curvature, or because of some fault of development or impaired function which was not directly connected with it.

As is the case with the greater number of congenital abnormalities, the statements of authors, with regard to the causation of congenital malposition of the scapula, are very largely speculative; a fault very pardonable in view of the paucity of reported cases, and of the peculiar difficulties with which the study of malformations is associated. As has been

remarked by Pitsch,² while there is much uniformity in the descriptions of the cases hitherto reported, there are at the same time so many contradictions apparent that it is not possible to draw conclusions of value, with reference to the etiology, from the physical examinations of the various observers. Sprengel's hypothesis depended upon his observation that in two of his cases the arm of the affected side was held diagonally across the back of the child at the time of birth and for a considerable period following. In another case he noted that this was the habitual position assumed while the child was asleep. Furthermore, he found that in the attempt to imitate this position in normal children, the scapula assumed relations corresponding very closely to those present in his cases. This, he states, may be demonstrated by placing the arm in such a position that the dorsal surface of the forearm shall be in contact with the back, the dorsal surface of the hand being applied to the iliac crest of the opposite side. He concluded that this position may be produced by the pressure of the uterine wall, the liquor amnii being deficient in quantity. The scapula being in this abnormal position, its fixation might very well be explained by the lack of development in its muscles following.

Perman and Hoffa have each observed this position of the arm. In my own case diligent inquiry failed to show any such abnormal position of the arm at the time of birth, or, for that matter, afterwards. An examination of the chest contour, however, makes it seem possible that unusual pressure was borne by the child *in utero*. It is possible that the deficient development of the left lower extremity was likewise due to this cause. That the abnormal position of the arm was not observed at birth might be explained by assuming that it was corrected during the earlier part of labor, —this assumption, surely, need not be considered far fetched. The more frequent situation of the abnormality on the left side has been ascribed to the predominance of left occipito-anterior positions in which the left shoulder lies posteriorly.

I have laid stress upon the hypothesis of Sprengel rather

than upon those of Kölliker³ and Schlange,⁴ because it seems to me the most probable, the least speculative, and because I believed to have found a feature corroborative in my own case. Briefly stated, Kölliker believed the condition to have been due to an exostosis of the scapula in his first two cases. Finding in a third case⁵ that the supposed exostosis was the superior angle of the bone, somewhat elongated and curled forward, as in Sands's case, Kölliker abandoned his hypothesis in favor of Sprengel's. Schlange's assumption, of adhesion between the trapezius and annion, seems scarcely worthy of consideration without more evidence. Kirrmisson,⁶ having observed the condition twice, clinically and pathologically in one instance of multiple malformations, believed the condition to be primarily a fault of osseous development; an explanation likewise very indefinite, but one not inconsistent with Sprengel's hypothesis. In my case the considerably diminished size of the left scapula, as compared with the right, lends some slight evidence to Kirrmisson's view. This difference in the size of the scapula is noted in Wolffheim's⁷ case also.

In reporting a case which was apparently one of bilateral malposition of the scapula, Milo⁸ proposes a division of these cases into two classes,—a "muscular form," in which the alteration in the form and position of the scapula is secondary to shortening and contracture of the cervico-dorso-scapular muscles, and another form, in which the deformity is to be ascribed to an actual or apparent exostosis. In the muscular form, function of the arm is always interfered with; not so, however, with the second variety. This would seem unsatisfactory and even unnecessary, inasmuch as the cases of the latter variety should be classed as cases of malformation, exostosis, etc., and not malposition of the scapula. In addition, as I have already observed, Kölliker found the supposed exostosis to be nothing more than the elongated superior angle,—in one case at least.

The diagnosis of congenital malposition upward of the scapula ought always to be made with ease. If, in addition to

the history, the physical examination shows not only the projection of the superior angle upward, for this might be simulated by a true exostosis, but also the elevation of the whole scapula, and especially the tilting of its axis and the diminution of all its diameters, there is scarcely another condition with which it might be confused. Pitsch makes a possible exception, in this regard, of an acquired malposition of the scapula, described by Eulenberg, and due, according to him, to a contracture of the levator anguli scapulæ and upper part of the trapezius, caused probably by contusion.

When it is remembered that the condition which we are considering causes so little interference with normal function, amounting in some cases to nothing at all; that the disfigurement which it produces is comparatively slight and without tendency to progress; that the scapula is not easily controlled by mechanical measures, it is not surprising that there should be remarkably little to say about the treatment. The attempts at purely mechanical treatment seem in no instance to have been successful. As may be seen in the report of Sands, above given, simple division of the levator and trapezius was unsuccessful, but a considerable benefit resulted from the excision of the projecting superior angle. In two cases Hoffa has obtained results which were satisfactory, both functionally and cosmetically, by separating the muscular attachments at the superior angle, and at the same time resecting the bony projection. Kirrison treated his cases by suspension and methodical movements of the arm, succeeding in this way in achieving an improvement in the scoliosis; the position of the scapula, however, remained unchanged.

The fact that so little can be accomplished in mechanically controlling the position of the scapula, that the chief practical importance of the abnormality depends upon the slight disfigurement rather than functional impairment, is sufficient to prevent one from insisting upon therapeutic attempts, unless the movement of the arm be considerably interfered with. Should it be desirable, however, to intervene surgically, the operations of Sands and Hoffa⁹ may

offer sufficient encouragement by their results to warrant the recommendation to the patient of a procedure similar in character to these.

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A CASE OF TRANSPOSED VISCERA, WITH
CHOLELITHIASIS, RELIEVED BY A
LEFT-SIDED CHOLECYSTOS-
TOMY.¹

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It is supposed that transposition of the viscera was known by Aristotle, who regarded this exceptional condition as a punishment inflicted by the gods. But the first authentic cases were reported at the time of Molière, when, among others, transposition of the viscera occurred in Her Majesty, Maria of Medici, the queen of France. Probably it was this illustrious coincidence which gave the matchless father of modern comedy, not believing in the latest triumph of anatomical research, a welcome chance to ridicule the physicians. With satire excusable by the ignorance of the time, yet worthy of a better cause, he used their "aspirations for sensation," as he called them in his comedy "*Le Médecin malgré lui*" (first produced in 1655). There the dreary hero, Géronte, answers Sganarelle, the would-be physician: "*Il n'y a qu'une seule chose qui m'a choqué: c'est l'endroit du foie et du cœur. Il me semble que vous les placez autrement qu'ils ne sont; que le cœur est du côté gauche, et le foie du côté droit,*" to which Sganarelle responds, "*Oui, cela était autrefois ainsi; mais nous avons changé tout cela, et nous faisons maintenant la médecine d'une méthode toute nouvelle.*"

Even Leibnitz, the greatest philosopher of his era, sneers:

¹ Presented to the Section on General Surgery of the New York Academy of Medicine, March 13, 1899.

“ La nature peu sage
 Et sans doute en débauche
 Plaça le foie au côté gauche,
 Et de même vice-versa,
 Le cœur à la droite perça.”

Later times have established the existence of transposition of the viscera as a fact beyond doubt; still, the literature on this most interesting subject is rather poor, so that excuses are hardly needed for any addition to it.

As is well known, the total transposition of the viscera means an inversion of their relative position, like that of an image reflected in a mirror. The most conspicuous signs of transposition are: the apex-beat on the right, the possibility of palpating the liver on the left, and of percussing the tympanitic sound of the stomach on the right. It is claimed that there is also left-handedness.

How easily, in spite of such marked characteristic signs, diagnostic errors occur is illustrated by the well-known case of Virchow,¹ who found total transposition on the autopsy-table in a case where the clinical report had stated that, on auscultation, the heart murmur in the scrobiculum cordis was “perceived with difficulty,” on account of the synchronous presence of bronchitis, and that the “spleen was very much enlarged.” In this case the heart-murmur had not been looked for on the right, and the liver had been taken for the spleen.

It goes without saying, that to determine the position of the heart is in many cases of the greatest importance. But from a surgical stand-point, especially that of the stomach, liver, and cæcum, it is still more important, if only the possibility of the presence of cysts, echinococcus, and particularly of cholelithiasis and appendicitis is considered.

The following is a unique case of total transposition of the viscera: the circumstances having permitted a thorough inspection of the abdominal viscera.

¹ Cf. Küchenmeister, Die angeborene, vollständige seitliche Verlagerung der Eingeweide des Menschen, Leipzig, 1883, p. 140.

A married woman, thirty-nine years of age, born in America, who had six children, all of them being well, gives a favorable family history. Her father died at forty-seven, of alleged gastric trouble (she thinks similar to her own). An uncle died from the effects of cholelithiasis. The mother, seventy-two years old, is still alive and well. One sister is alive and healthy; four died in childhood; one died at twenty-four, of typhoid fever.



FIG. 1.—Patient four weeks after cholecystostomy.

The patient had always been well up to her twenty-fifth year, when she began to suffer from severe headaches followed by vomiting, chills also being sometimes present. These attacks have become much more frequent during the last four years. From that period cough was often also noticed. Sometimes there was a pain of a slightly colicky character in the left lumbar

region. Jaundice was never present, nor were there ever any bile-pigments found in the urine.

To Dr. Henry Ruhl, who had been her attending physician for years, belongs the credit for having diagnosticated the presence of dextrocardia as soon as he became acquainted with the patient. When the patient complained of the lumbar pain, Dr. Ruhl detected a movable kidney, on the left below the liver. Nephropexy was advised, and the patient admitted to St. Mark's Hospital.

On November 5, 1898, I found the following state present:

The patient is thin and slimly built. Panniculus adiposus undeveloped. She is left-handed. The diameter of the left forearm exceeds that of the right by one-half inch, and the left hand-grasp is stronger than the right. Both thoracic halves appear normal, and there is no difference in their circumference.

Percussion reveals absence of the heart-dulness on the left, and lung-resonance instead, while on the right the latter has disappeared from the lower margin of the third rib, and dulness has replaced it. The dull sounds are perceived from the parasternal to the mammillary line.

Auscultation reveals vesicular breathing over the whole left thoracic portion, except in the interscapular sphere, where rhonchi are heard. On the right the same condition is found, with the exception of the clear heart-sounds being perceived on the right. The apex-beat is in the sixth intercostal space and in the mammillary line.

The liver is palpated in the left, its margin overlapping the rib-arch to the extent of fully one and one-half inches. Deep palpation is impossible, on account of the presence of considerable meteorism. The dulness commences on the lower margin of the sixth rib and ends five centimetres below the lower thoracic aperture.

Below the left anterior superior spine of the os ilii a tumor of the size and shape of a normal kidney is felt; it is of moderately soft consistence, and can be freely moved. So, agreeing fully with Dr. Ruhl, and attributing the gastric symptoms to the existence of a movable kidney, I performed nephropexy two days afterwards. No reaction followed at first, but nine days afterwards the same gastric symptoms recurred, of which the patient had formerly complained,—viz., pain in the epigastrium, vomit-

ing, general malaise, and a slight elevation of temperature. After repeated and thorough examinations and consultations, I got the impression that some other abdominal disturbance existed, the nature of which we had been unable to disclose. Anæsthesia was administered, and deep palpation revealed a resistance on the outer margin of the left rectus muscle, below the anterior margin of the liver. An exploratory incision along-side the outer margin of the rectus was made, and disclosed the presence of cholelithiasis. Cholecystostomy was performed now without delay. Recovery was uninterrupted.

The anatomical relations of the abdominal viscera, as far as they could be made out during the operation, were as follows:

The liver is situated in the left hypochondrium. The incisura for the ligamentum teres corresponds fairly with the median line. The lower margin of the liver extends from the lower margin of the cartilage of the right eighth rib to the lower end of the cartilage of the seventh rib of the left side. The small lobe covers the minor curvature, the pylorus, and the horizontal portion of the duodenum.

Its consistence is soft; the margin is thin; the thickness is about six centimetres; the longitudinal diameter about twenty-four, and the anterior posterior diameter about seventeen centimetres. The large lobe fills the left hypochondrium up in its entirety. The smaller lobe extends over to the right side.

The gall-bladder is situated in the fossa longitudinalis sinistra anterior, between the suspensory ligament and the anterior margin of the liver. Its fundus is buried below the anterior margin of the liver, overlapping the gall-bladder entirely; which explains why palpation failed to detect the presence of cholelithiasis. Its situation is behind the tenth costal cartilage, and it extends backward to the small lobe between the large and the quadratic lobe. The cystic duct, as is evident still from the shape of the gall-stones (Fig. 2), crosses the hepatic part of the duodenum rectangulantly. Below the ligamentum hepatis duodenale the hepatic artery is found, while the hepatic duct is directed towards the large lobe. Between the hepatic duct and the artery is the vena porta. The common duct, descending on the right at the middle of the descending portion of the duodenum, enters the latter on the right.

The whole organ appears enlarged and of normal color:

Palpation revealed the presence of a hard, pear-shaped mass, evidently biliary calculi. The fundus of the gall-bladder was carefully secured by two thin, silk sutures and pulled forward. After turning the patient on her left side, and surrounding the gall-bladder with sterile compresses, an incision was made between the two silk threads. Only a few drops of dark-green bile escaped. Two ligatures were then applied to the opposite margins of the wound, in order to get a firm hold. Three large quadrangular calculi were then, with little difficulty, extracted; and on introducing the finger into the gall-bladder a fourth stone, of smaller size and triangular shape, was detected. The illustration (Fig. 2) shows that its crooked tip had an irregular surface, which

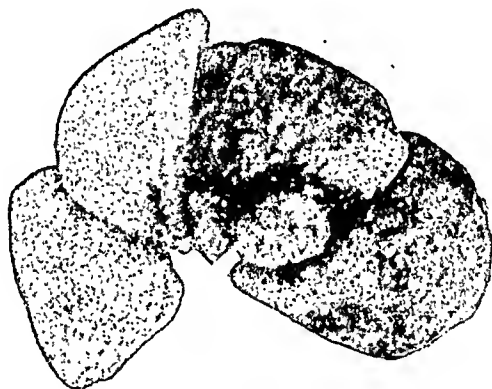


FIG. 2.—The four biliary calculi as attached to each other. Two-thirds natural size.

kept it impacted in the cystic duct. It was only with great difficulty that it could be detached from the walls with a blunt spoon.

The wound of the gall-bladder was then sewed up, only a small opening being left, through which a rubber drain, surrounded by iodoform gauze, was introduced. The margins of this opening were then stitched to the peritoneum and fascia. The rubber tube was connected with a long rubber hose leading into a bottle, which stood at the bedside, and which was filled with a strong bichloride solution. By thus draining off the bile excessive soiling of the dressing, a thick layer of iodoform gauze and moss-board, was avoided.

The illustration is an exact representation of the situation of the calculi in the gall-bladder and two-thirds of their natural size. They were all faceted. Each one consisted of a solid black

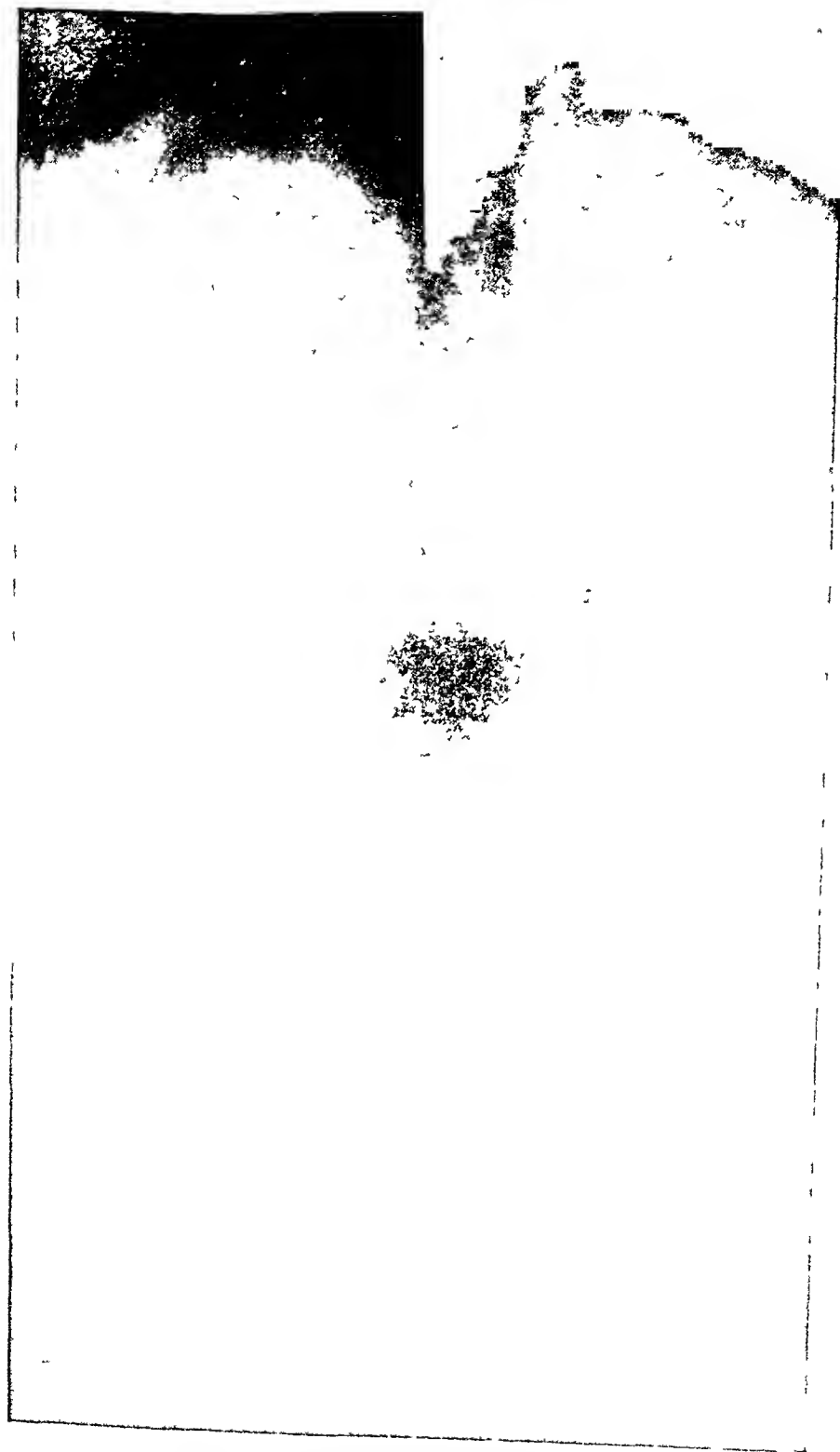


FIG. 3.—Dr. Beck's case of transposition of viscera.

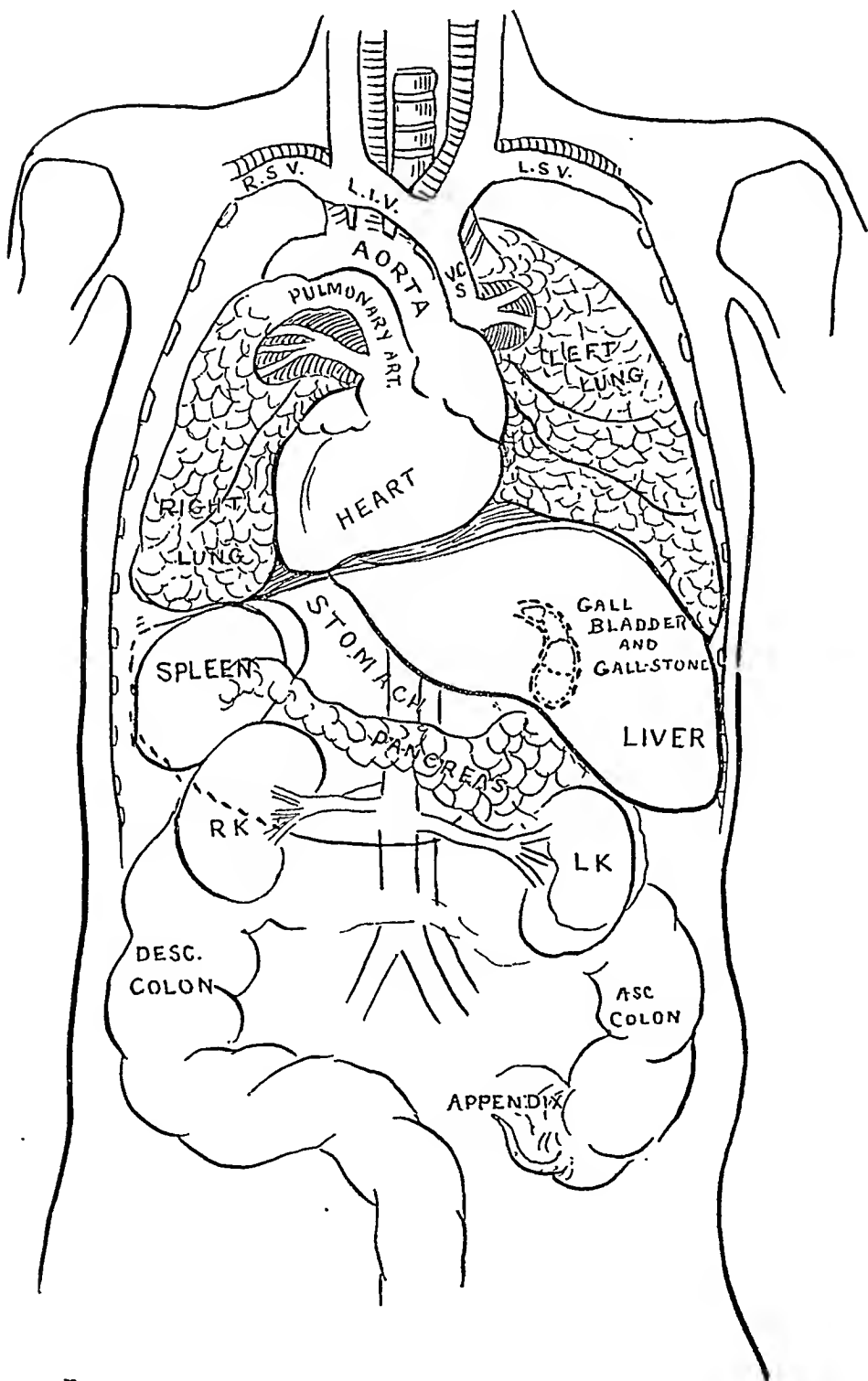


FIG. 4.—Diagram showing entire transposition of viscera in case reported.

nucleus, a thick middle layer of radiating crystals of cholesterin, and a thin, soapy outer one of cholesterin and bile-pigment.

The stomach is situated in the right hypochondrium, the fundus being directed towards the right, and the pylorus being on the left. Nothing else abnormal was found.

The pancreas is situated to the right below the stomach and the small hepatic lobe, and rests on the posterior abdominal wall. Its head extends over to the left. The cæcum and the appendix are situated in the left iliac fossa, while the descending colon occupies the right iliac region. The sigmoid flexure extends from the right iliac crest to the upper margin of the sacro-iliac junction. The vermiform appendix is seven centimetres long, and its diameter is six millimetres; it is slightly curved. Its mesentery is normal. The ascending colon makes its turn where it touches the gall-bladder, and then extends a little farther upward to the large curvature of the stomach. The spleen, which is of small size and of oval shape, is situated in the right hypochondrium, between the fundus ventriculi, the diaphragm, and the right kidney. It reaches from the lower margin of the ninth rib to the upper margin of the eleventh. There is no accessory spleen. Both kidneys are symmetrically located, sideways from the transverse processes of the spinal column. They appear to be normal. The lower margin of the left kidney is somewhat lower than the right one. The abdominal aorta is found to the right from the vena cava inferior. The uterus is slightly displaced to the left.

The relations of the thoracal organs were demonstrable by skiagrams, which showed the light shades of the lungs, which on the left extend an inch farther down than on the right. (Fig. 3.) Passing over the spinal column and to its right the well-marked shade of the heart is noted, which is darker in its upper and middle portion than on the periphery. On the left the shade of the liver is most distinct and passes over to that of the left kidney. The light portions below correspond to the intestines.

A large skiagram (20 x 24) of the whole trunk shows the relations indistinctly, while the small thoracal skiagrams are well-marked. The different abdominal skiagrams only show small separate areas of distinctness. Altogether, ten abdominal skiagrams were taken in different positions. From the study of the separate areas, together with the abdominal inspection, I was able to delineate the schematic illustration 4.



Bony pelvis prepared to illustrate case of sacro-iliac dislocation.

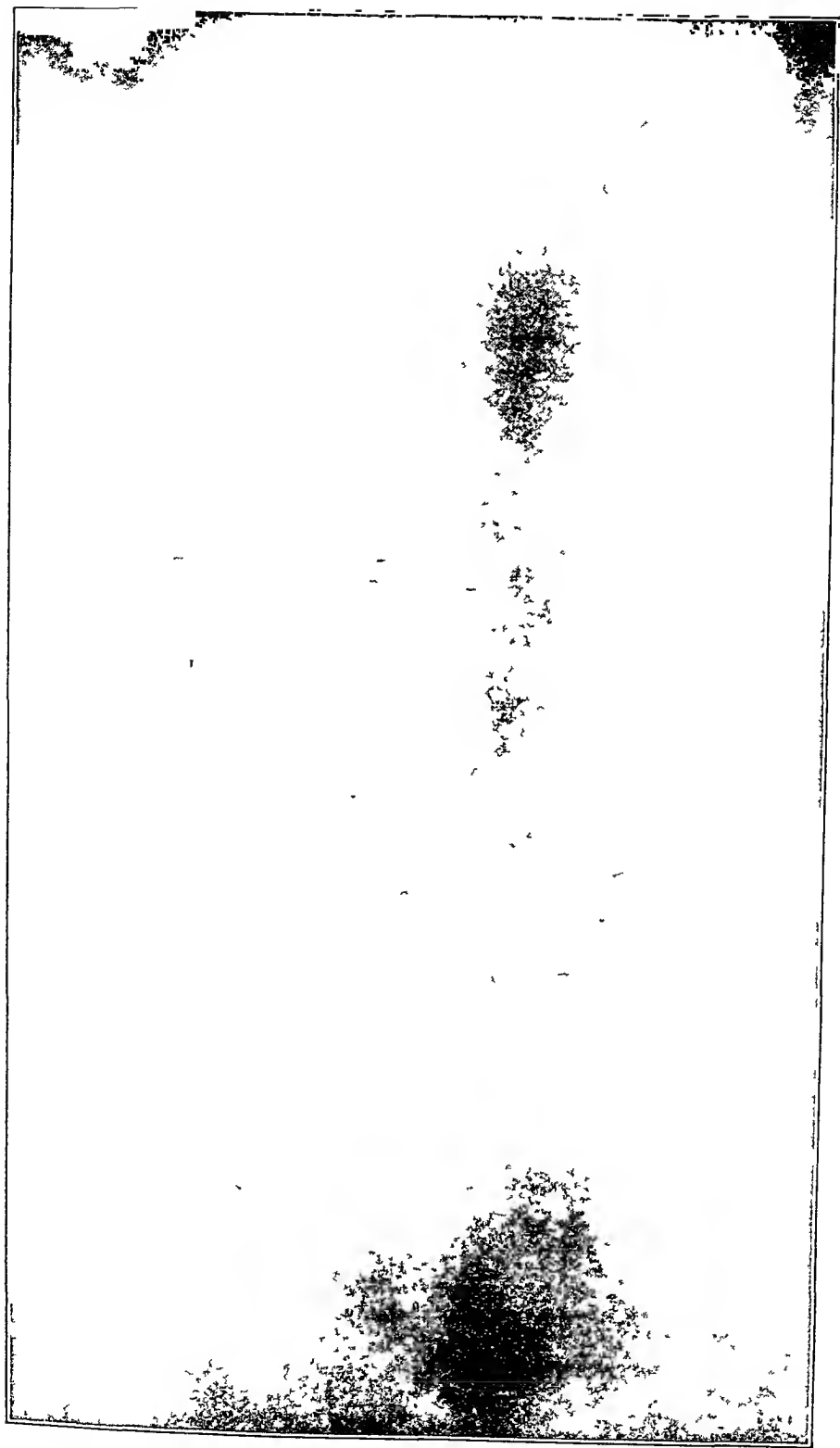


FIG 5.—Relation of liver to heart.

COMPLETE SINGLE SACRO-ILIAC DISLOCATION.¹

By WILLIAM BARTON HOPKINS, M.D.,

OF PHILADELPHIA.

H. F., aged eighteen years, was admitted to the Pennsylvania Hospital December 23, 1898, having been caught in an elevator. The patient on admission showed considerable shock. The expression of the lower extremities suggested the existence of luxation of the femur upon the dorsum of the ilium, as the left limb was shortened and the foot everted, as in "everted dorsal dislocations." Examination of the hip-joint, however, showed it to be unhurt. Turning the patient upon his right side, the left ilium was found to entirely overlap the sacrum, so much so, that the tips of the fingers could be insinuated beneath it, as they can beneath a scapula. Exploration was then made for the other point, which had yielded to allow of this break in the pelvic ring. As was expected, it was found at the symphysis pubis. The joint was quite mobile, the mobility being easily discernible by pressure upon the anterior processes of the ilium. The left limb was shortened because the ilium had risen above its normal position, and the limb was everted because the ilium in riding over the dorsum of the sacrum had altered correspondingly the direction of the glenoid cavity. (The deformity as it existed is graphically demonstrated in the accompanying illustration.) A deep right-angled contusion of the integument over the left side of the sacrum testified to the violence of the forward pressure which had caused the dislocation. There was no paralysis, nor was there evidence of concealed hæmorrhage of any severity. The patient was etherized after recovering somewhat from the shock, with the view of attempting to reduce the dislocation. The indications to accomplish this result were recognized to be forward extension of the ilium and counter-extension backward of the

¹ Read before the Philadelphia Academy of Surgery, February 6, 1899.

sacrum. Traction upon the glenoid cavity conveyed through the left thigh, flexed at a right angle with the long axis of the body, was decided upon as the most effective forward extension of the ilium. For the backward counter-extension of the sacrum the natural procedure of placing the operator's foot upon the abdomen, at a point corresponding to the promontory of the sacrum for counter-extension, was not available here, lest further mischief should be done to the already damaged pelvic contents. Backward counter-extension of the sacrum was therefore obtained through the spine and right glenoid cavity. Through the spine by looping a sheet around the abdomen and tying it to the edge of the bedstead, and through the glenoid cavity by forcible counter-extension at the hands of two assistants. Two strong efforts accomplished the restoration, not absolutely, but so nearly that the edges of the sacrum and ilium were felt to abut against each other, and the deformity to be almost entirely overcome. It was decided that if the patient recovered, as no inconvenience whatever could result from the slight deficiency remaining in adjustment, it was more prudent to desist from a further effort. Patient was placed on his back, upon a hard mattress, with sand-bags at his hips and a compress beneath the left ilium. There was considerable abdominal tenderness, and tympany for one week, which then subsided. After this the patient showed no unfavorable symptoms. He was allowed to sit up in six weeks, and at the end of seven weeks walked with crutches. There was no tendency to recurrence of the dislocation, and the patient made a good recovery.

Harris (*North American Medical and Surgical Journal*, Philadelphia, 1827, Vol. iv, p. 77) mentions the case of a woman, thirty-five years of age, who had borne one child, where the injury was inflicted by a blow upon the sacrum from the clinched fist of her husband. A frail, delicate woman whose pelvic joints had presumably been weakened by pregnancy.

Dr. Gibson, who was called in consultation, found, upon examination, a considerable hollow over the upper part of the sacrum, produced by the unnatural backward projection of the posterior superior spinous process of the ilium. When the patient moved her right leg, an aggravation of the pain

was experienced, accompanied by a distinct crepitation. The slightest motion conveyed an impression to her as if, to use her own language, her "hip-bones were separating."

Mr. Thorsby Jones (*British Medical Journal*, 1878, Vol. i, p. 5) reported a case of fatal injury from being struck by a locomotive engine, in which there was partial forward luxation of the sacrum from both ilia. In this case the patient died in seven hours. His notes of the autopsy being as follows:

"An extravasation of blood was found occupying the rectovesical pouch and the loose tissue around; and on dissecting through this, the ilio-lumbar artery, on the right side, was seen to be wounded. The veins on this side were unhurt; but on the left side the external iliac vein was wounded at a point opposite the left sacro-iliac articulation. On removing the rectum, bladder, the vessels, and loose tissue from the pelvis, it was at once seen that the sacrum was unusually prominent; and further examination showed that it was separated from its articulation with the ilium on each side. The anterior sacro-iliac ligament was ruptured,—all but a few of its fibres. The anterior border of the articulating surface of the sacrum was at least a quarter of an inch in front of that of the ilium, on both sides. The posterior aspect of the articulation was then examined, and here the ligaments could not be well defined, on account of the laceration of the glutæus maximus and the extravasated blood. A careful examination was then made of the whole of the pelvis, and at no point was a fracture discovered."

Dr. E. A. Lewis, of Brooklyn (*New York Medical Journal*, 1885, Vol. xlii, p. 715), reports a case of a man who, while riding on horseback, was unseated and came down astride of the withers of the horse. Though there were very painful symptoms pointing to injury of the sacro-iliac articulation, there was no external evidence of displacement. He reports a second case, also without deformity, which presented symptoms, nevertheless, of serious disturbance at this joint.

A case of so-called sprain of the sacro-iliac joint, caused

by lifting, which was followed by abscess and death, in a tubercular subject, is mentioned in the report of the Marine Hospital service.

The case which I now report will be seen to differ essentially from any of those above mentioned. The important factor of deformity, the primarily essential feature of displacement at the sacro-iliac joint, has been so frequently wanting in cases which were presumed to be dislocations, that one recognizes a certain incredulity among authors, when speaking of supposed or unauthenticated cases of this injury; it is spoken of as a dislocation difficult to recognize. Not so in this case, as stated in the report, the fingers could be insinuated beneath the ilium as they can beneath the scapula of a thin and relaxed subject. The shortening of the limb on the injured side, which I believe was an inch, and its rotation outward, as in everted luxation of the femur upon the dorsum of the ilium, sufficiently proved the degree of overlapping of the sacrum by the ilium. The intense pain immediately after the receipt of such an injury, which has characterized other cases, was not observed in this case; probably owing to the patient's condition of shock. The intense pain observed for weeks after, on the slightest motion or change of position in bed, was perhaps avoided in this case by retaining the patient in a state of fixation; that there was no hæmorrhage nor paralysis fortunately prevented serious, if not fatal, complications. While not attempting, therefore, to have exhausted the literature of this very rare and interesting injury, I venture the opinion that it is the first case recorded of complete sacro-iliac dislocation occurring in a sound pelvis to recover after reduction.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, December 28, 1898.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

EXCISION OF A TRAUMATIC ANEURISM OF THE SUPERFICIAL FEMORAL ARTERY.

DR. C. K. BRIDDON presented a man, thirty-nine years of age, who had been admitted to the Presbyterian Hospital, November 23, 1898, with a rounded tumor, about six inches in diameter, filling up the apex of Scarpa's triangle of the left thigh. The skin over it was normal. It was firm, elastic, not tender, indistinctly fluctuating, non-pulsating, attached to the muscles of the thigh, and the skin was freely movable upon it. Over its upper and inner part could be heard a faint but distinct systolic bruit.

The left thigh over the tumor was twenty-two and three-fourths inches in circumference; the right was nineteen inches. Pulsation could be distinctly felt in the femoral at the base of Poupart's ligament. No pulsation could be distinguished below, either in Hunter's canal or in the popliteal space or in the anterior or posterior tibials. There was no change in the surface temperature from that of the normal side or other evidence of insufficient circulation.

An exploration was made in the out-door department, before entering the hospital, by needle and fluid, but old blood was obtained. On his trunk and limbs were numerous pigmented scars as of syphilides.

The patient gave a history suggestive, but not conclusive, of syphilis, having had on his penis, ten years before, a sore without secondary symptoms. A year before he had two painful swellings beneath his scalp, which disappeared after a course of internal medication.

Two weeks before his admission, without any history of traumatism, he noticed, on rising in the morning, that his left lower extremity was stiff and sore, with dull pain in the region of the knee. At the same time he discovered a hard, tender lump in the upper part of the thigh, about the size of a walnut, not large enough to be apparent to the eye. From its discovery to the day of admission to the hospital it grew steadily, the pain increasing, but still remaining moderate in severity. So far as he knows, it never pulsated. Apart from the local condition his health was entirely good.

By November 30, seven days after admission, the tumor seemed nearly double its size as first seen, and measured $7 \times 9\frac{1}{2}$ inches. It was fancied that a very slight pulsation could be detected. It seemed possible to diminish slightly its size by pressure on the femoral vessel, and on releasing the artery it seemed to increase to its previous size. During the week his evening temperature was 100° F. each day, and his morning normal.

An incision three inches in length was then made from a little above Poupart's ligament downward over the course of the common femoral. The artery, when exposed, was firm, but manifested a fair degree of elasticity in the expanse of its pulsation. A provisional silk ligature was passed around the vessel, so that, if necessary, it could be compressed against the loop by an assistant's finger. A second incision was then made over Hunter's canal, at the junction of the upper three-fifths and lower two-fifths of the thigh, and deepened until the sartorius came into view. Beneath this the roof of Hunter's canal, stretching between the adductor magnus and the vastus internus, was incised, and the long saphenous nerve, with the femoral artery, was exposed: a temporary ligature of silk was also passed around this vessel as above. The extremities of the incision were now united by another ligature over the convex surface of the tumor, which was deepened to and through the fascia lata. Directly under this structure the wall of a sac came into view, composed of connective tissue containing muscle fibre, evidently that of the sartorius spread apart. On pressing outward the inner edge of the muscle there was a sudden escape of a large mass of blood-clots followed by bright-red blood. This was immediately controlled by the assistants who had charge of the ligatures already passed. The cavity left by the blood-clots was sponged out, and

was found to be large enough to contain sixteen to twenty ounces of fluid. Its walls were formed of the neighboring connective tissue and muscles, and were lined by semi-organized, coagulated blood. Across its bottom, in its usual course, lay the superficial femoral artery, with a ragged rent in its anterior wall, from which escaped fresh blood whenever the pressure above or below was relaxed, with much more force from the proximal than from the distal opening. No true aneurismal sac was seen, nor was there evidence of any having ever existed. A heavy ligature was passed and tied around the proximal portion of the vessel at as high a point as its exposure in the wound allowed, this being about four inches below Poupart's ligament; on relaxing the tension of the upper pulmonary ligature the vessel was seen to pulsate forcibly. The distal end was separated from its vein for a short distance and ligatured; when the pressure on the vessel below this point was stopped, it failed to pulsate. The cavity was thoroughly cleansed of detritus by washing with salt solution, wiped dry, and a considerable tamponade of iodoform gauze put in place. The incision, which was fourteen inches long, was closed with silk sutures, except for a short space at the middle, to allow egress for the drain, and another at the top for the preliminary ligature around the common femoral, which was left in place for a few hours to afford easy control over the artery in case of secondary hæmorrhage. The lower extremity from the wound to the toes was bandaged in cotton-wool and placed in an elevated position.

Following the operation no change could be detected in the circulation of the limb. The next morning the temporary ligature was removed, and on the second day the large gauze drain was taken out and the edges of the wound brought together by several additional sutures. There was very little reaction, and the wound healed throughout by primary union.

DR. ELLSWORTH ELIOT, Jr., who had assisted Dr. Briddon at the operation, referred to the complete absence of pulsation in the aneurism, and inquired whether this was a common feature in a diffuse, ruptured aneurism which had become circumscribed, as in this case. The speaker said he attributed the absence of pulsation to the fact that the sac contained a considerable amount of coagulated blood. The opening of the sac was immediately followed by the discharge of a great deal of this material, making

it, at the time, impossible to determine whether its cavity was that of a hæmatoma or of an aneurism. The length of time that had elapsed between the occurrence of the aneurism and the operation had allowed a collateral circulation to become established; the limb remained perfectly warm subsequent to the operation, even in the dependent position. The size of the aneurism in this case was such that it had cut off about three inches of collateral circulation.

DR. A. B. JOHNSON said that, at the present time, a faint pulsation of the dorsalis pedis could be made out, but none behind.

Dr. Johnson said that, in reference to the question asked by Dr. Eliot about the absence of pulsation in an aneurism of this character, he himself had, on one occasion, cut down on a ruptured abdominal aneurism, believing it to be an enlarged kidney. There was no pulsation whatever. The aneurism was about the size of a child's head at term, and its interior contained a dense layer of clots. There was no sac.

DR. A. J. MCCOSH said he had recently had under his observation for two and a half months a case of popliteal aneurism at the Presbyterian Hospital. At first the pulsation was distinct, and then for about five weeks no one could feel any pulsation, while during the remaining three weeks a very faint pulsation could be made out. The aneurism was about as large as a coconut, and was treated by excision. When, after three weeks in bed, pulsation had ceased, it was thought that the aneurism was cured, and that an operation would be unnecessary.

Dr. McCosh said he had had a similar experience to Dr. Johnson, in having cut down on a dissecting aneurism of the aorta, under the impression that he had to deal with a sarcoma of the kidney. The operation was an exploratory one, during the course of which the blood-clot in the aneurism was broken; this was followed by a large gush of blood which was checked by means of clamps, but the patient died shortly afterwards.

DR. BRIDGON further said that of thirteen cases of popliteal aneurism which had come under his observation, one was of gouty origin, the rest being dependent on syphilis. In one case, which he saw about thirty-five years ago, at the old New York Dispensary, the patient was a colored man, with a diffuse aneurism of the femoral artery. In that case, the speaker said, he in-

tended to tie the external iliac, but, by the advice of the late Dr. Gordon Buck, he tied the common femoral instead. On tying the ligature there was a spurt of blood in all directions, and in order to check this, he immediately tied the external iliac. The patient was then transferred to the hospital, and it was subsequently found necessary to tie his superficial femoral, the profunda femoris, the common iliac, and the internal iliac at intervals of ten or twelve days. There was no gangrene of the leg following these ligations, but the patient died of exhaustion from the repeated hæmorrhages. That man's common femoral artery is now in the Museum of the New York Hospital. At the autopsy it was found that, at the point where Dr. Briddon had ligated the femoral, the artery had been converted into a brittle, quill-like tube, and had parted in all directions.

Dr. Briddon said he had never met with an external aneurism in which there was no pulsation. In the case under discussion it was surprising that no disturbances of nutrition in the parts below followed excision of the aneurism. It has always been regarded as wise not to tie an aneurism when it is small, allowing it rather to attain some size, so that a collateral circulation can be set up. The absence of pulsation in this case was probably attributable to the fact that the aneurism contained a large blood coagulum, with little or no fluid.

Dr. Briddon said that some years ago he treated a popliteal aneurism by compression, not tying the vessel at all; in that case, even after the sac had become filled with a firm, fibrinous deposit, —sufficiently large to enable the man to get about for years afterwards, until his death occurred from an internal aneurism,—there was distinct pulsation; it was more in the nature of a lifting pulsation, but it could readily be made out.

NEPHRECTOMY FOR RENAL TUBERCULOSIS.

DR. F. TILDEN BROWN presented a young woman who had been sent to him, by Dr. C. A. Herter, on November 14, 1898, on account of symptoms of a calculus lodged in the ureter. The patient's history was as follows: She was thirty-four years old, and had enjoyed good health up to two years ago. About that time she first began to experience discomfort in the left lumbar region, coming on after prolonged exercise. Last August, after a two hours' sea-trip, she vomited and had diarrhœa for three

days. During the trip a severe pain developed in the left side, below the ribs, and continued for three hours. Since that time she has had a paroxysm of the same kind nearly every day, lasting from twenty minutes to three or four hours. The pain begins and is referable throughout to a point two inches to the left of the umbilicus, extending towards and below the last rib posteriorly. It is of a severe, boring character. Nausea does not accompany the pain. The patient has lost twenty pounds since last August.

A physical examination showed that the patient was well nourished, but slightly anæmic. The left kidney was not palpable and not tender. At the point where the iliac vessels and ureter cross the pelvic margin palpation gives pain, but the same is elicited with a similar degree of pressure on the opposite side.

At the time of the patient's first visit to Dr. Brown commencing menstruation led to a postponement of the cystoscopic examination. In the urine, passed at this visit, he found tubercle bacilli. A week later both ureters were catheterized with Brunner's instrument, first the right, collecting six cubic centimetres of urine in about twenty minutes; then a similar amount from the left in six minutes: the color of the latter was much lighter than the former, and showed a faint sediment. The mouths of the ureters and the mucous membrane surrounding each were normal in appearance.

The critical analysis of the urine, by Dr. F. E. Sondern, resulted in the diagnostic conclusions that the right kidney showed nothing abnormal; that the left kidney showed tubercular pyelonephritis, plus a suspicion of uric acid stone or gravel.

The diagnosis of unilateral renal tuberculosis was made and nephrectomy advised. The patient was kept under observation and preparation for a week at the Presbyterian Hospital, and on the 1st of December nephrectomy was done through a lumbar incision under chloroform anæsthesia. On turning the kidney out of the wound the artery and vein were secured in a single, chromicized catgut ligature. The ureter, still attached to the kidney, was stripped from its peritoneal attachment for as great a distance (four inches) as the external wound would permit, and ligated with chromicized catgut. The lumen of the stump was cauterized. The tissues were sutured in series. Before closing

the wound, a small strip of rubber tissue was passed between the sutures, to be removed the following day.

On the day after the operation twenty-five ounces of urine were passed. For four days the highest temperature reached was 100° F.; after that it became normal. For thirty-six hours after the operation nausea and vomiting were very persistent, although lavage gave intervals of relief. The average daily secretion of urine for seven days previous to the operation was twenty-six ounces; the daily average since the operation has been thirty-four ounces.

The kidney, which was shown at a previous meeting of this society, had a small (one-half inch), necrotic, tuberculous lesion in the parenchyma, involving the site of a former papilla, the associated calyx presented a number of tubercles, and again at the junction of the ureter and pelvis tubercles were fairly numerous. Here the tunics surrounding the mucous coat were infiltrated and showed a firm, grayish cedema. This considerable thickening was appreciated before turning the kidney out, and gave some support to the pre-existing suspicions of a lodged fusiform calculus. A partial occlusion of the ureter by such sub-mucous infiltration may have been the cause of the paroxysmal pains referable to a lower point in the ureter.

The specimen as a whole revealed a much earlier stage of tuberculous disease than is ordinarily met with in nephrectomy, and must emphasize the considerable value attaching to the separate collection of the urines from each kidney when tubercle bacilli are found in bladder urine.

DR. A. B. JOHNSON expressed the opinion that as large a portion of the ureter as possible should be removed with the kidney in these cases. In a number of instances coming under his observation, where a tuberculous ureter was left behind, the urine continued to contain tubercle bacilli, and in some cases a tuberculous sinus remained in the loin, although the general health of the patients improved.

Dr. Johnson said that, before a tuberculous kidney is removed, it is the duty of the surgeon to satisfy himself by some means more definite than palpation that the remaining kidney is healthy. The objection that has been raised against catheterization of the ureters in these cases—*i.e.*, that the infection might thus be carried to the healthy kidney—was possibly a valid one,

although the speaker said he had never known it to occur. Harris's instrument can be advantageously employed in these cases, especially in women: it is nearly painless, and its action is very satisfactory.

Referring again to extirpation of the diseased ureter, Dr. Johnson said that, in cases where the patient's condition is such that a prolonged operation is inadvisable, the lower portion of the ureter should be removed at some later period.

DR. BROWN said that in certain cases the Harris instrument might be employed to advantage, but the idea that it is to prove a perfectly satisfactory substitute for the catheterizing cystoscope he believed to be fallacious. It is a great satisfaction to see the catheter emerge from the ureter after collecting the necessary amount of urine, and after viewing the interior of the bladder. When using the Harris instrument great care should be taken not to allow the urine accumulating on one side of the partitioned bladder to pass to the opposite side by brief occlusion of either outlet in the instrument. Frequently there is a great inequality of the urinary supply from the two organs, and any such stoppage might result in an overflow to the opposite basin. In the case under discussion, for example, it took twenty minutes to gather six cubic centimetres of urine from one kidney, and only six minutes to gather the same amount from the opposite kidney. This is by no means an extreme case of such inequality.

The length of ureter which can be taken out in continuity with the kidney is limited by the brim of the pelvis; anything beyond that is out of the question until a later operation.

DR. WILLIAM B. COLEY said that with the Harris instrument in the bladder it would hardly be possible for the urine on one side to overflow and mingle with that on the opposite side, as the bulb-attachment prevents any accumulation of urine. The speaker said that in the one case in which he had employed the instrument it was very satisfactory.

DR. MCCOSKIN said that, in connection with extirpation of the ureter, the suggestion of Kelly, to remove the lower portion of the tube through the vagina, should not be forgotten. The speaker said that in one case he removed over three inches of the ureter through the vagina, the remaining upper portion having been taken out with the kidney. Vaginal access to the ureter is comparatively easy.

TUBERCULAR CERVICAL LYMPH-NODES.

DR. CHARLES N. DOWD read a paper with this title, for which see page 559.

In connection with his paper, Dr. Dowd presented a number of patients upon whom he had operated by various methods for the removal of tubercular glands in the neck.

DR. JOHNSON said he had seen two or three cases of tuberculosis of the lymphatics in the neck which eventuated in acute general miliary tuberculosis. In one case, seen at Bellevue Hospital many years ago, a comparatively trifling operation for the removal of the glands was rapidly followed by general miliary tuberculosis, and death two or three weeks later. On the other hand, the speaker said, he had seen very severe cases, with involvement of the connective tissue of the neck, where the operation was followed by the happiest results. In one such case, coming under his observation, the operation was done ten years ago, and the patient to-day is in comparatively good health, without any symptoms of tuberculosis.

Dr. Johnson called attention to the fact that chronically enlarged glands in the neck, due to an inflammatory hyperplasia from the presence of pediculi capitis, are not infrequently removed by surgeons under the impression that they are of tuberculous origin.

In the removal of tubercular cervical lymph-nodes, the speaker said, he preferred to make an incision which will freely expose the great vessels, especially the internal jugular vein. At times, the S-shaped incision has certain advantages. Recently, he has resorted more frequently to the horseshoe incision, with the opening of the horseshoe, turned either anteriorly or posteriorly, according to the situation of the larger mass of the glands. This incision is usually very satisfactory, and only slightly disfiguring, as it is mostly covered by the collar. He was rather timid about removing a very large lymphatic through a straight incision in front of the sterno-mastoid, as is done by many surgeons, for fear of injuring the internal jugular vein while drawing out the gland, and thus causing serious hæmorrhage, which it might be difficult to control. The ultimate prognosis of these cases is rather doubtful, as the patients are usually lost sight of.

DR. L. W. HOTCHKISS said that, in operating on tubercular

glands of the neck, the principal thing, from the surgeon's standpoint, was to have a definite idea of what was to be accomplished. Where the glandular enlargement is extensive, he should plan the incision, beforehand, in such a manner as will completely disclose the field of operation, and give entire control of the great vessels and nerves. The speaker said that in operating on these cases he had employed various incisions; more recently, the one suggested by Hartley, which runs along the anterior border of the sterno-mastoid from the ear to the clavicle, and then an incision outward above the clavicle. This gives a triangular flap which, on being deflected, exposes the whole side of the neck. This incision can be supplemented by smaller ones, if the necessity arises. It makes a very large wound, but the resulting scar is not unsightly, as the incision is made along the natural cleavage lines of the neck and just above the collar-bone, where it cannot be seen. It thoroughly exposes both the anterior and posterior triangles of the neck, and through it one can divide the sterno-mastoid muscle and completely remove the diseased glands. In extensive cases it is certainly preferable to the S-shaped, or H-shaped, or various other incisions which have been recommended; and with the addition of an anterior incision extending up the jaw, the speaker had been able to make a clean removal of diseased glands from the submaxillary region to the sub-clavian. The extensive wound heals *per primam* frequently in a week or ten days, and the patient is often up and about on the second or third day.

DR. GEORGE WOOLSEY said that, in connection with tubercular cervical lymph-nodes, the question of etiology was an interesting feature, and usually an obscure one. In the cases that have come under his observation he has often been unable to find any cause for these enlargements, either in the tonsils, pharynx, naso-pharynx, or scalp.

The question of ultimate prognosis is also rather obscure, as most of the cases are lost sight of. We know that relapses occur, even after a very radical operation. As regards the method of incision, that shown by Dr. Dowd certainly seems to give a very excellent result: it furnishes a good exposure of the field of operation, at least in the upper two-thirds of the neck. The vertical incision seems to give a more unsightly scar than an incision made more transversely, and there is a greater tendency to the

formation of false keloids. Dr. Woolsey said that in many cases he has lately used and liked the incision recommended by Kocher: and in more extensive cases the S-shaped or Z-shaped incisions suggested by Hartley.

DR. DOWD said that he had found that the incision which follows the line of the carotid, and then has a limb running upward and forward under the jaw, leaves an awkward angle, in which the skin is likely to retract in healing, thus leaving an unsightly scar in a very prominent place in the neck. And this is greatly intensified if there should be anything approaching to a keloid formation. The incision should be so planned that we can reach the submental and submaxillary groups of lymph-nodes, if necessary, and follow up the anterior and posterior chains. The incision, which he had proposed in his paper, exposed these groups very well, better than any other which he had ever tried, and the resulting scar is hardly to be noticed. In answer to the question of Dr. Brown as to the danger of injuring the facial nerve, Dr. Dowd said that he had had two or three cases where a slight, temporary paralysis of the lower filaments of the facial nerve followed operation. For a few weeks a slight difference could be seen in the movements of the lower lip at the two angles of the mouth. He had also seen two other cases where a permanent paralysis of this description existed. The scars in these two cases indicated that there had been extensive sloughing of tissue with probably incision and removal of broken-down submaxillary nodes. He felt convinced that the injury to the nerve was due to the fact that some of the lower filaments were cut in the tissues when they were retracted in the endeavor to clear well the tissues under the jaw; the incision should be made as low as is practicable.

EXTERNAL ŒSOPHAGOTOMY FOR STRICTURE OF THE ŒSOPHAGUS.

DR. L. W. HOTCHKISS presented a man, aged forty years, who, on February 27, 1898, drank a considerable quantity of strong hydrochloric acid in mistake for whiskey. He was brought at once to the hospital, in a condition of intense shock, and suffering intensely from pain in the region of the pharynx and stomach. He was brought out of his condition of shock

with great difficulty. One week after admission an examination of the throat showed the pharynx, tonsils, and uvula greatly swollen and congested, and a mass of yellowish-gray exudate, extending over the left tonsil onto the uvula and nearly to the right tonsil. He complained at this time of great pain and difficulty in swallowing. This dysphagia became more and more marked. By the 23d of March pain and spasmodic closure of the œsophagus, with regurgitation of fluid food at times, became a marked feature of the case, and he was losing flesh very rapidly. The spasmodic closure of the pharynx was very marked, at times not allowing the patient to take any food by the mouth for hours, and then letting up for a time, and permitting him to swallow a little fluid. The patient located by his own sensations the points of obstruction to the passage of food, at points corresponding to the level of the cricoid and at a point within the chest before the stomach is reached. Attempts were made to pass a small tube into the œsophagus on March 27, under cocaine, but were unsuccessful. The patient had for several days been mostly nourished by rectal feeding. Transferred to the surgical side March 26. An examination at this time showed a stricture at a point six and three-quarters inches from the teeth which stopped the passage of a small conical as well as the smallest bulbous œsophageal bougie. External œsophagotomy was done under chloroform anæsthesia, on the same day. This operation was chosen because it was thought by this means the œsophagus could be opened below the upper stricture and above the lower ones, and that both could possibly be treated from this opening without resort to a gastrostomy. The œsophagus was opened on the left side, a little below the level of the cricoid cartilage, though the operation was complicated somewhat by an enlarged left lobe of the thyroid gland, which made it necessary to tie the superior thyroid artery and vein and the middle thyroid vein before it could be held aside to give good access to the œsophagus. Through the œsophageal opening it was easy to pass a small bougie upward and downward. A constriction was detected just above the opening, which was rapidly dilated by a good-sized catheter, which was easily forced up into the mouth. A small-sized œsophageal bougie was then passed to the stomach with but little difficulty, although the passage seemed rough and full of strictures. A good-sized bougie was forced

through into the stomach without causing any considerable hæmorrhage, and a large catheter was left in the œsophagus, and the outer wound partially closed and the rest packed. The patient was regularly fed through this tube, and seemed to pick up rapidly, although the introduction of food into his stomach, even in small amounts, often caused great pain, and this was sometimes accompanied by spasm of the œsophagus also. The stomach will only tolerate very small quantities of food. On April 1 the tube was removed and the patient allowed to take some fluid by the mouth. This was accomplished by the patient with only very small leakage at the neck-wound, if he drank very slowly and carefully.

He was kept in the hospital until May 10, bougies being passed into the stomach through the mouth or œsophageal wound at frequent intervals. The wound in the neck closed in a few weeks, and the larger bougies were used through the mouth, and the patient became able to take both solid and fluid food, and gained in weight over forty pounds. He has bougies passed at weekly intervals still, and there is still a constriction low down in the œsophagus which requires some force to pass. He suffered with gastric pains for a long time, and even now often has much distress after eating. He also still has at times marked spasm of the pharynx, and is at these times unable to swallow any fluid. These attacks soon abate, and he is then able to eat and drink comfortably.

Stated Meeting, January 11, 1899.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

RESULT OF EXCISION OF POPLITEAL ANEURISM.

DR. A. J. MCCOSH presented a man, thirty years old, a baseball player by occupation, who, in the spring of 1898, while running, sprained his left knee; this was followed by considerable pain and tenderness in the region of the knee and popliteal space, which continued throughout the summer. In August, 1898, he first noticed a swelling in the left popliteal space, which gradually increased in size. When he entered the hospital, the latter

part of August, the tumor had attained the size of a small cocoanut; it pulsated, and gave all the characteristics of a popliteal aneurism. The patient was kept in bed on a restricted diet, and at the end of three or four weeks the pulsation of the aneurism had entirely disappeared. About a month later, however, intermittent pulsation was again noticed, and it was then decided to excise the aneurism. A vertical incision was made over the growth on the back of the limb, the artery tied above and below, and the aneurism dissected out. The vein was flattened out over the aneurism and very adherent to it, so that in trying to dissect it off it was torn, and had to be ligated above and below. The wall of the aneurism was composed of clotted blood, with a small channel running through the centre, which seemed to be irregular, and was, perhaps, large enough to admit the index-finger. The wound healed without any trouble. After the operation there was slight swelling of the leg, which has since disappeared. The man is gradually regaining full power in the leg, and he has resumed his work. There was no history of syphilis.

LIGATION OF THE THIRD PORTION OF THE SUBCLAVIAN ARTERY FOR ANEURISMAL VARIX.

DR. JOHN F. ERDMANN presented a man, aged twenty years, a gymnast, who, with the exception of some involvement of the tarsus of the left foot, had always been a healthy man until August 19, 1898, when he was shot by the accidental discharge of a revolver, the ball entering the left chest about one and a half inches below the middle third of the clavicle. This, he says, was followed by an immense swelling of the neck, which persisted for a week or ten days, also by a feeling of numbness and loss of power in certain regions of the forearm supplied by the median nerve, and, in addition, a peculiar noise in the chest like that produced by a light wind or breeze. Some days later he noticed pain in the region of the dorsal aspect of the inner condyle of the humerus, and also pain and tingling down the course of the ulnar nerve, from the inner condyle to the tips of his little and ring-fingers of the left side.

The wound healed promptly, and required no dressing after the first week. On the fifth or sixth day the ball was removed

from the supraspinous fossæ, the incision being made in about its middle portion. This wound also healed kindly. Upon examination of the ball, it was found to be of 32 calibre, and had but one small indentation upon its surface.

On September 23, 1898, when seen by Dr. Erdmann, his condition was the following: Well nourished and muscular development well marked. A small, dark-red scar, about three-eighths of an inch in diameter, in the infraclavicular region of the left thorax. Another scar, about one and one-quarter inches long, in the supraspinous region of the left side. The arm presented a slightly cyanotic or livid appearance, and a mild degree of atrophy as compared to the opposite side. Musculature somewhat flabby. Upon palpating the forearm pain was complained of in the course of the ulnar nerve. Fingers flexed with some difficulty, but extended readily. Forearm flexed not so readily as the right. Extended normally. Chest palpation, anteriorly, revealed no tumor, but a thrill of marked intensity throughout the upper half of the left side, extending up in the neck for a distance of two inches; posteriorly, thrill evident, but not pronounced over the supraspinous region. Thrill felt in the axilla and also in the upper brachial region. Auscultation: Murmur of the bee-buzzing variety heard over the area of the chest as seen outlined in the Figures 1 and 2.

The small spot under the clavicle, in Fig. 1, represents the wound of entry, while the line or mark in the supraspinous region, in Fig. 2, represents the scar made in the removal of the ball. The lines seen extending down the arm and forearm represent the position at which murmur could be heard in the vessels.

He was kept quiet for several weeks, during which time careful note was made as to the conditions of the lesion. No change for the better taking place, except possibly an increase in power of the fingers during flexion, it was decided to cut down upon the subclavian artery, ligate it, and sew the aperture in the vein.

On November 11, 1898, the operation was performed, in the presence of the house staff, several visitors, and Dr. B. F. Curtis, who also kindly assisted later in the operation.

The patient was anæsthetized with ether, and a modification of the incision of Berkeley G. A. Moynihan, of Leeds, was made after the following manner:

A curved incision with convexity downward was made, beginning at the junction of the inner two-fourths of the clavicle, passing just above the scar of the wound of entry, and terminating at the junction of the outer two-fourths. The skin flap was dissected up to the clavicle, and a blunt dissection made of the pectoralis major, exposing the first portion of the axillary artery. The axillary vein and artery were separated, and then were followed upward until the cicatricial tissue in the track of the bullet was found encroaching upon the third portion of the subclavian.



FIG. 1.—Aneurismal varix, anterior view.

There was a band of this new-formed tissue one-half inch wide; the dissection was then made on the proximal side of the scar tissue until a small portion of the vessels was cleared. At this stage of the operation blood could be seen bubbling and boiling towards the distal end of the subclavian and axillary vein, and assuming a course from the artery. This boiling was synchronous with the pulsation of the artery.

Compression of the scar tissue would produce complete cessation of the anomalous circulation, and also cause complete disappearance of the thrill in this region.

When the communication between the vessels was dissected out freely an aneurism-needle, threaded with heavy silk, was passed beneath it. This communication was three-eighths of an inch wide by one-eighth of an inch long, just allowing an ordinary-sized aneurism-needle to pass between the vessels. After the needle was passed, further dissection was attempted with a view of removing all new-formed tissue possible. While making this dissection the communication was nicked, and owing to the



FIG. 2.—Aneurismal varix, posterior view.

unstable tissue, of which it was composed, rapidly tore through about half its width. Bleeding was readily checked by pressure on the needle. The needle was withdrawn and the silk tied about the communication. Hæmorrhage was absolutely controlled; then, finding it impossible to ligate the proximal side without further dissection, it was deemed advisable to saw through the clavicle. This was done at its inner and middle thirds with a Gigli saw; the distal clavicular flap was drawn upward and out-

ward, exposing fully all the structures at the root of the neck. Still there was considerable difficulty met with in liberating the proximal part of the third portion of the subclavian, due to the structures being matted together by the cicatricial tissue about the track of the ball. After the plexus and artery were freed, a ligature of silk was tied about the proximal end of the third portion of the subclavian artery, just at the outer edge of the scalenus anticus. Another was then placed about the artery, at about the beginning of the first portion of the axillary. Then a ligature was placed about the communication and the original one of long silk was removed. Owing to the time involved and the patient's condition, the portion of the artery between the ligatures was not removed. The clavicle was wired and the wound closed without drain.

Barring a point of superficial suppuration, due to inversion of about one-fourth inch of skin-flap, the wound healed primarily.

The ordinary care and precautions in dressing the extremity were taken, both with a view to artificial warmth and to retain the fragments of the clavicle in their normal positions.

At the end of twenty-four hours the color of the fingers and the forearm was of a healthier hue than for six weeks past. At the end of the sixth day feeble radial pulsation could be felt, and at the end of the tenth pulsation was quite demonstrable.

The patient was allowed to leave his bed on the tenth day, and was with difficulty restrained from doing some of his stage feats. Union in the clavicle at present is not solid, but is improving markedly during the past two weeks.

The acute pain in the course of the ulnar nerve has disappeared, but he complains occasionally of tingling in the little and ring-fingers.

Flexion of the fingers has improved considerably, and the index-finger, in which the inability to flexion was very pronounced, is now very much better.

There has been no murmur nor thrill since the ligatures were applied.

ARTHROTOMY FOR FRACTURE OF THE NECK OF THE FEMUR IN A BOY.

DR. PERCY R. BOLTON presented a boy who, on August 8, 1898, fell from a fourth story window. He was taken to Bellevue

Hospital, where it was found that he had sustained a fracture of the ilium, between the crest and acetabulum, and, in addition, a fracture of the neck of the femur. Under ether the affected extremity and pelvis were enveloped in a plaster spica.

At the end of five weeks the dressing was removed. The hip soon assumed a position of slight flexion outward, rotation, and abduction, from which it could with difficulty be restored. Adduction particularly could not be carried beyond the median line even under anæsthesia, and all movements of the joint were accompanied by crepitus.

It seemed as though displacement of the fragments was present, or possibly a thyroid dislocation.

The joint was therefore opened by an anterior incision. The head was in place; there was a complete fracture of the neck, one and a half inches from the margin of the cartilage; the periosteum was torn through in the whole circumference of the neck; the fracture surfaces were in contact, but there was no union. Repair was entirely absent in the part of the neck attached to the head of the femur, nor was there any circulation going on there.

There was some evidence of repair in the other fragment.

The head of the femur was therefore—because of absence of circulation in it—removed and the wound closed.

Healing was without incident. The patient now wears a Judson stem adjusted by Dr. Royal Whitman, and goes about with great freedom.

There is three-fourths inch shortening. Flexion 90 degrees.

DR. WILLY MEYER said that about five years ago he brought before the society a man, forty years old, who had an intracapsular fracture of the neck of the femur, of long standing. There was very little shortening on the affected side. When the joint was opened, it was found very difficult to bring the fragments into apposition, the head forming the upper fragment, and the entire neck and shaft the lower fragment. Apposition was finally accomplished with the aid of two long nails, which were driven through the trochanter major into the head, the surface of the two fragments first having been thoroughly freshened with the curette. Dr. Meyer said that screws would have been preferable to nails, but he did not have them at hand. The patient's recovery was uneventful, and the resulting good motion proved

that union had been obtained between the two fragments. At the time this patient was shown, two members who examined him expressed the opinion that cicatricial union had occurred. However, Dr. Meyer said, he had been led to believe rather that bony union had taken place.

Dr. Meyer said he did not wish to be understood as implying that the above method would have been applicable in the case shown by Dr. Bolton, although it possibly might have been.

DR. FRED. KAMMERER said he had attempted the method described by Dr. Meyer, and had failed completely in his endeavors to bring the fragments closely enough together that they could be held by a nail or screw. As a final resort, he had to excise the head of the bone.

CYSTOSARCOMA OF THE THIGH.

DR. A. B. JOHNSON presented a woman, aged twenty years, who was admitted to Roosevelt Hospital on March 27, 1896, having been healthy until the commencement of her present illness. One year before admission the patient noticed a lump as large as a hickory-nut upon the inner aspect of the left thigh, close to the fold of the groin. It was painless; the skin was freely movable over it, but it appeared to be firmly fixed to the deeper tissues. This mass gradually increased in size, but without pain, deterioration of the general health or other inconvenience, except that arising from the size of the tumor. On admission to the hospital the patient was a fairly nourished young woman. There was a smooth, elastic, fairly firm mass occupying the inner side of the left thigh, extending from the fold of the groin downward a distance of five inches, and laterally to a point opposite the great vessels upon the outer side and to the junction of the internal, with the posterior surface of the limb upon the inner side. The skin was freely movable over the mass, which appeared to be incorporated with the bellies of the adductor muscles. An aspirating needle, introduced into the substance of the tumor withdrew a thin, blood-stained fluid. On March 31, 1896, a semilunar curved incision was made, convex downward, eight inches in length, beginning in front, just below the fold of the groin, at the middle of the anterior surface of the thigh, and ending posteriorly at a slightly lower level upon the posterior aspect of the limb. The tumor included in its substance

the gracilis and adductor longus muscles, and a portion of the sartorius. Sections of each of these muscles were removed with the growth; although slightly adherent to the sheath of the femoral vessels, the tumor was dissected free without injury to the vein. Numerous large veins proceeding from the tumor required ligature. The tumor measured 5 x 4 x 3 inches. It was of a somewhat irregularly globular outline, and contained numerous cavities filled with bloody fluid. Microscopic examination showed a fibrocystic sarcoma of the spindle-celled type.

The somewhat large wound was cleaned, some of the divided muscle sutured, and the skin wound closed. Primary union occurred, and the patient left the hospital five weeks later. At the present time, two years and ten months after operation, the patient is in good general health and shows no signs of recurrence. The power of adduction is slightly less upon the left side than upon the right; there is no atrophy of the limb.

VENTRAL HERNIA FOLLOWING OPERATION FOR APPENDICITIS.

DR. A. B. JOHNSON presented a woman, aged forty years, who, in September, 1895, had been operated upon in the Roosevelt Hospital for appendicitis, with abscess. The incision was made a little external to the border of the right rectus muscle; the wound was allowed to heal by granulation, and the patient left the hospital, well, five weeks after operation. A few months later she began to notice that the scar pouted outward, especially upon coughing or exertion. In spite of a body-bandage, the tumor steadily increased in size.

On July 28, 1898, she was readmitted to the hospital, well nourished and stout. Upon the right side of the abdomen, in the iliac region, was an oblique scar, three-quarters of an inch by four inches, which, though flat when she was lying down, projected when she stood up, forming a tumor measuring 3 x 4 inches. There was a distinct impulse upon coughing; the tumor was easily reducible. Through the scar could be felt an orifice in the wall of the abdomen, about three inches in length, the edges were firm and hard.

On August 3, 1898, under nitrous-oxide and ether narcosis, the scar was excised, including the peritoneal lining of the sac. The outer margin of the ring consisting of the aponeurosis of

the external oblique; the tendinous portion of internal oblique and transversalis was split, and the external oblique was dissected away from the underlying structures for a distance of two inches, and for a space four inches in length vertically. Upon the inner side an incision was made four and a half inches long, opening the sheath of the rectus. The posterior layer of rectus sheath, and the peritoneum upon the inner side were united to the internal oblique and transversalis and peritoneum, upon the outer side, by means of catgut sutures.

The body of the rectus muscle was then dragged outward from its sheath, and by means of mattress sutures was united to the under surface of the aponeurosis of the external oblique, at a point about two inches external to the site of the hernial protrusion; thus the body of the rectus came to lie in front of the suture-line, joining the internal oblique and transversalis to the posterior layer of the rectus sheath. The divided aponeurosis of the external oblique was then sutured to the anterior layer of the rectus sheath, and the skin wound was closed in the ordinary manner. Catgut sutures were used throughout, except for the skin-wound, which was closed with silk.

The patient was allowed to sit up upon the twenty-second day, and left the hospital upon the twenty-eighth day. She was directed to wear no abdominal binder or support of any kind. At the present time, five months later, the patient apparently has a slight general prominence of the abdominal wall, but no evidence of weakness in the region of the scar. On account of the extreme thickness of the abdominal wall it is difficult to say, positively, whether the rectus muscle has remained in its new position or not.

DR. GEORGE WOOLSEY said the case of ventral hernia shown by Dr. Johnson was interesting for several reasons,—namely, the excellent result obtained, the method adopted to strengthen the abdominal wall, and, lastly, the occurrence of such a large hernia after an operation for appendicitis with an incision like the one mentioned by Dr. Johnson. Post-operative herniæ are more apt to occur when the incision is made in the semilunar line, which divides many of the nerves supplying the lower half of the rectus, and especially when the wound is left open and packed, none of the structures being sutured.

OBSERVATIONS ON THE USE OF THE GALVANIC CURRENT IN THE TREATMENT OF FALSE ANKYLOSIS.

DR. FRED. WALKER GWYER read a paper with the above title, for which see page 551.

DR. WOOLSEY said that some years ago he had seen a few cases of false ankylosis in which the treatment advocated by Dr. Gwyer had been tried, and, generally speaking, the results were good. Since then, however, the speaker said, he had become interested in another method of treatment, which might be termed prophylactic. The treatment he referred to was by massage; this he had found very efficacious in cases of injury near joints, —either a fracture or a sprain. The functional results of this method of treatment have been so satisfactory that he has adopted it as a matter of routine. The massaging is followed immediately by passive motion. This method of treatment prevents the occurrence of ankylosis, either partial or complete.

DR. OTTO G. T. KILIANI said that, during the past autumn, he had treated a number of cases of threatened ankylosis of the knee-joint, of gonorrhœal origin; two of the cases were acute, with suppuration, while a third was of rather long standing. The hot-air method of treatment was employed, with excellent results. In two of the cases the return of motion was complete.

DEVICE FOR ENURESIS PARALYTICA.

DR. OTTO KILIANI related the following case and presented the screw referred to.

On June 15, 1881, the patient, a man, then twenty-nine years of age, apparently received an injury to the spine, falling a distance of seventy feet, with the result of complete paralysis of the lower extremities, the rectum, and bladder. Sensation in the legs was impaired, but not lost. Six weeks after the accident his legs had improved sufficiently to enable him to walk about; he regained control of the rectum, but suffered greatly from incontinence of urine. The anæsthesia in the region of the nervus pudendus was and remained complete. The patient wore a portable rubber urinal for ten years. As this proved unsatisfactory, he replaced it by an ordinary one and a half inches carpen-

ter's screw (about one-fourth inch in diameter), which he screwed into the prepuce. On June 4, 1897, he was admitted into the German Hospital on account of mal perforant of the right foot. He had then used the screw for six years. The margin of the prepuce was hard, thick, and almost cartilaginous, without the slightest evidence of ulceration. The orifice has contracted to a small opening which, through its entire length, measuring three-fourths inch, bears a thread corresponding exactly to the thread of the screw, so that it admits the latter only when properly



FIG. 1.—Screw stopper to orifice of prepuce, used for control of enuresis paralytica.

started. The prepuce has widened to a sac of 200 cubic centimetres capacity; and the screw fits so exactly that it keeps the patient dry up to the pressure of this amount of urine. He therefore practically has a urinal within his body, or a secondary bladder, if one chooses to call it so.

Dr. Kiliani had an ivory screw made for the patient, to replace the one of steel, so that the specimen could be at his disposal. Figs. 1 and 2, from photographs, one an X-ray picture, of the glans and prepuce injected with 160 grains of saturated solution of alum, the other, of the patient's penis with the screw

in place, and the ante-glandular sac stretched to its full capacity, show the details of the case.

DR. BRIDDON referred to a precisely similar case, which he had seen some years ago at the Presbyterian Hospital, probably the same man.

DR. BROWN said he thought the patient whose case was reported by Dr. Kiliani and the one who was under Dr. Briddon's observation at the Presbyterian Hospital, about two years

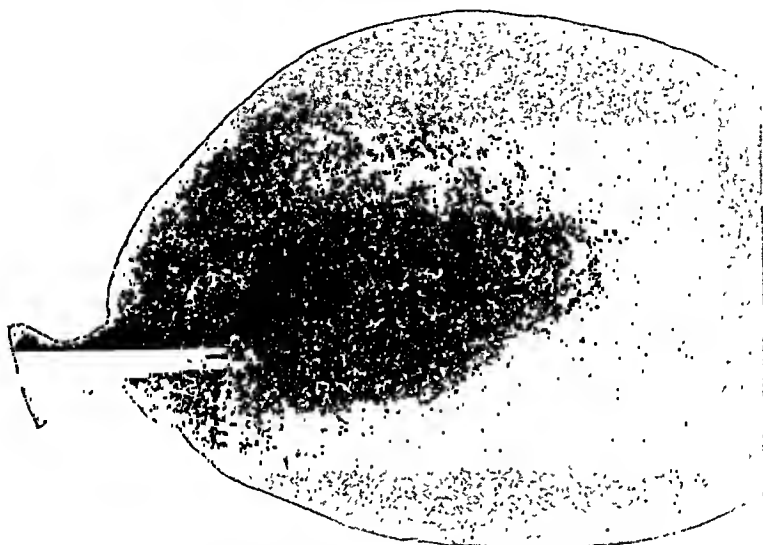


FIG. 2.—Skiagraph of distended prepuce, with orifice stopped by iron screw.

ago, were one and the same person. At that time he had been invited to see the patient by Dr. Briddon. The case was one of paralysis, due to spinal injury, and, in order to control the incontinence of urine, the man employed a screw which at that time he inserted into the preputial orifice,—not the meatus,—thus making a veritable water-tight urinary diverticulum capable of containing three ounces or so of urine.

GASTRIC ULCER TREATED BY EXCISION.

DR. F. TILDEN BROWN showed a gastric ulcer, an inch in diameter, which he had that day removed from the posterior wall of the stomach. The patient was a man, fifty-two years of age, who had long been a hard drinker. He was taken sick with epigastric pain, indigestion, and vomiting the latter part of September, 1898, and was admitted to Trinity Hospital about two

weeks ago. An examination of the stomach contents, after a test meal, showed the ordinary amount of hydrochloric acid. His pain, which was relieved after eating, could be brought out by pressure over a point in the epigastrium, which corresponds with the left rectus muscle, about an inch and one-half from the left costal border. At this point what seemed a mass could be felt, but muscular resistance could not be excluded. The man also complained of pain at times in the neighborhood of the left shoulder-blade. Three days ago he had quite a severe hæmorrhage, all of the blood being passed by the bowels. The question arose whether the man was suffering from a gastric ulcer or carcinoma of the transverse or descending colon.

An incision was made in the median line, and after pulling the omentum upward and to the right as far as a left side adhesion would permit, the finger, passing underneath the transverse colon, could just touch a nodular mass overlying the aorta. For some reason, not understood, it was impossible to draw the transverse colon downward into the wound. The incision was then carried up to the ensiform cartilage, the gastro-splenic omentum was torn through, and the cardiac end of the stomach drawn outward and over, as it appeared it brought with it the splenic flexure of the colon, which was firmly adherent to the stomach at the point of ulceration. The two organs were separated, and as the gut had become somewhat eroded at the point of contact it was dusted with iodoform, and the serous coat was turned inward by several Czerny-Lembert sutures. The gastric ulcer with a liberal margin was then excised, and the coats of the stomach sewn together separately in three tiers with fine silk. A secondary Lembert suture was applied to the serous coat.

A thickened induration is noticeable at one pole of the tissues surrounding the ulcer.

DR. ELLSWORTH ELIOT, Jr., in connection with the case reported by Dr. Brown, spoke of one which had come under his observation at the Presbyterian Hospital on the previous day. The patient had been seen by the visiting physician for the first time that afternoon, and no satisfactory history was obtainable. There was vomiting, and distention of the lower half of the abdomen, with considerable rigidity of the abdominal wall. The temperature was normal; pulse, 145 per minute; weak, but regular.

On opening the abdomen in the median line, below the umbilicus, a large amount of pus was evacuated, apparently coming principally from the pelvis. The intestines were matted together, and the condition presented was one of a general septic peritonitis. The appendix was found to be practically normal. The patient's condition was such that nothing more than irrigation and packing the wound was done. Death occurred twenty-four hours later, and at the autopsy an ulcer of the stomach was found. A peculiar feature of the case was that the peritonitis was apparently confined to the pelvic cavity. The ulcer was of the ordinary perforating type, with no evidences of malignancy.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, February 6, 1899.

The President, J. EWING MEARS, M.D., in the Chair.

SUPPURATIVE CYSTIC THYROID TUMOR.

DR. THOMAS G. MORTON presented a woman, thirty years of age, who was recently admitted to the Pennsylvania Hospital, with a greatly enlarged thyroid tumor, suffering from dyspnoea, serious pressure symptoms, and great exhaustion. An incision was promptly made on the left side of the tumor, where the distention seemed to be the greatest. At some considerable depth an abscess cavity was reached; a trochar was thrust through the centre of the tumor to the opposite side of the neck, and, through the cannula, a rubber drainage-tube was passed. Rapid subsidence of the symptoms followed, with gradual diminution of the tumor. The drainage-tube had not been disturbed, but would be allowed to remain until the tumor was practically absorbed. In the reporter's opinion, in treating such degenerative cysts, it was safer to favor their cure by incision and drainage rather than to attempt more radical procedures.

EXCISION OF ASTRAGALUS FOR TALIPES EQUINO- VARUS.

DR. MORTON presented several cases of club-foot, saying that some years ago he had brought before the Fellows of the academy a number of patients from whom he had excised the astragalus for congenital club-foot of the equino-varus variety; the question was then raised, whether or not, in time, ankylosis of the joint would result from this procedure? and the promise was made that, from time to time, the patients would be exhibited

for further examination. This had been done on several occasions, and now he presented still other cases. He stated that, after a large experience, in no instance had such ankylosis occurred, but good ankle motion had been secured.

He recognized in equino-varus two forms, one the *uncomplicated*, the other the *complicated* club-foot; in the former the deformity is due to contraction of tendons and soft parts without displacement of the bones of the tarsus; such cases are corrected by tenotomy, stretching, massage, and apparatus. The other, or the complicated, variety is always associated with displacement, partial or complete, of the astragalus. This bone has been invariably forced forward and out of its normal position; indeed the tibia, in some instances, is found articulating with the os calcis. The astragalus will in such a case be found quite subcutaneous and in advance of the tibia. While it remains in that position it prevents flexion of the foot; it is an obstacle to the foot being brought into a proper normal position. The astragalus, furthermore, becomes so changed in form that it could not perform its normal function in the articulation, even if it could be restored to its usual position. Several years ago he sent two specimens, taken from such cases in his operations, to the late Professor Joseph Leidy, who in reply wrote him as follows:

"The two specimens of bone, submitted to my examination a few days since, are so altered from the normal form that I utterly failed to recognize them as being the astragalus."

It is quite easy to determine the presence of a displaced astragalus, first, from the fact that the foot cannot be made to assume a right-angle position with the leg, and, secondly, it can be readily felt as a subcutaneous, irregular, bony mass anterior to the tibia.

In operating for excision of the astragalus, it is important to first perform very general tenotomy. This consists in dividing the flexor tendon of each toe (a most important part of the operation), the tendo Achillis, and the tendon of the anterior tibial (if found contracted). For the excision of the astragalus, the incision should extend in a straight or slightly curved line from the base of the fourth toe, over the most prominent portion of the astragalus, to the external malleolus. Then the knife is readily carried around the circumference of the bone, and all attachments are divided, and it can be removed with a curved scissors

and a bone-forceps. If there still remain any difficulty in placing the foot in a normal, right-angle position, the cause will be found in the cuboid, or other tarsal bone, and the bone in whole or part, in such case, should be removed. It is seldom that any ligature is required, and drainage will occur through the spaces between the interrupted sutures.

He exhibited two cases of congenital equino-varus (complicated, double), for which he had done an excision of the astragalus and cuboid.

CASE I.—A boy, W. S., aged fourteen, who was admitted to the Orthopædic Hospital in March, 1890. He then did an excision of astragalus and cuboid in each foot, after tenotomy of flexors of toes, and the tendons of the anterior tibial, and tendo Achillis. He has now normal flexion and extension of the foot and perfect position. He wore a brace for a very short time, a few months only.

CASE II.—A. M., aged twelve, who was admitted to the Orthopædic Hospital, November 10, 1898, with complicated congenital equino-varus. The limb was considerably atrophied, foot greatly deformed, and he walked on the cuboid. One week after admission the anterior tibial tendon, the tendo Achillis, and the toe flexors were divided; after which the astragalus, cuboid, and a portion of scaphoid were excised. The foot could then be placed in an easy, normal position. An excellent recovery has followed, with a useful foot and fair ankle motion.

COMPOUND DISLOCATION OF THE ANKLE-JOINT.

DR. MORTON presented a man, forty years of age, who, on November 19, 1898, fell into a cellar, which was some eight feet in depth, and received a serious injury of the ankle-joint. The lower end of the tibia was found protruding through a rent in the skin, where it was tightly held. On the same day, when a free vertical incision was made, the articular tibial surface was found detached, and in fragments was removed; the lower end of the fibula was also comminuted, fragments small, which were removed. The irregular lower end of the tibia was then divided transversely.

The injured (entire) upper surface of the astragalus was likewise removed with chisel, and this bone and the tibia were then united by silver wire.

Immediate union followed without any suppuration. In such a case as this, before the days of present wound treatment, the only operation to be considered would have been amputation.

Contrary to expectation, there has resulted excellent ankle motion, while the contour of the ankle is perfect. An apparatus is still worn to give greater security in walking.

DR. WHARTON remarked that when attempts were made to save these cases before the adoption of present methods of wound treatment, amputation usually followed in a few weeks. Diffused abscess often developed, involving the whole leg, or pyæmia or septicæmia, and death often resulted. The result in Dr. Morton's case is most satisfactory. In a similar case—that of a man who jumped off of an engine, sustaining a fracture of the fibula and a compound dislocation of the lower end of the tibia—he excised the lower end of the tibia, and removed all loose fragments; put up in pasteboards for a few days, and then put on plaster-of-Paris dressings. This man obtained a very useful limb. It is now over a year since the operation was done, and he is walking quite well.

DR. R. HARTE said that he recalled a case almost similar, which he had in St. Mary's Hospital, five or six years ago. When he saw the case it was in pretty poor shape, and he suggested the possibility of resection and taking out the lower end of the leg bones, which he did, and then wired. Although the case was more or less septic at that time, with a large abscess in the leg, he succeeded in getting a very satisfactory result. He saw the man some years afterwards; he was then able to do the ordinary work of a house-carpenter.

FLAT FOOT.

DR. MORTON then presented a case of flat foot, which had been treated by Gifford's spring, for the purpose of calling attention to that ingenious apparatus, worn inside the shoe, which he thought to be far superior to any other form of apparatus. The patient, a man thirty-two years of age, had suffered for more than two years, but had found entire relief since using this spring-sole in his shoe. The apparatus consists of two pieces of steel held together by a hinge on one side, and between the two is a piece of soft rubber. It is placed in the shoe on the inner side and forms an artificial arch, the rubber holding the plates apart, and the plates yielding with the weight of the body.

FRACTURE OF THE FIFTH CERVICAL VERTEBRA.

DR. T. G. MORTON reported the following case: On December 27, 1898, a man, aged thirty-five years, received an injury to his head as the result of a dive in shallow water, while in Jamaica, West Indies. There was no loss of consciousness at the time, but the patient was much excited, and believed that his neck was broken. There was loss of motion and sensation in the trunk and limbs. His temperature was below normal immediately after the injury (97° F.), but some twelve hours later it had risen to 107° ; this, however, was reduced by cold applications to 102° . His condition the following day was somewhat improved, he could move his head and arms and the muscles of his abdomen. The legs were motionless. There was involuntary urination, but he retained control over the bowels. The area of anæsthesia had for its upper border a line extending nearly horizontally around the trunk, just below the nipples. His mind was clear and disposition cheerful. It was believed by his medical attendants that he was suffering principally from heat-stroke and cerebral concussion. He was sent North on a fruit vessel, and was admitted, immediately after his arrival, January 10, 1899, into the Pennsylvania Hospital. Upon admission his temperature was normal, mind clear and cheerful. Sensation was impaired at nipple line, but normal a few inches above. Pupils equal and normally reacting. He could move his head and arms, but there was complete paralysis and anæsthesia of lower half of the trunk and lower limbs. All reflexes in lower limbs lost. Urine drawn by catheter, bowels moved by enema. Temperature 102° on the evening of admission. The urine contained a small amount of albumen, but no sugar. On the 13th, after consultation of the staff, it was decided that there had been an injury of the spine at or near the sixth cervical vertebra, and it was decided to operate. On the following day, under ether anæsthesia, Dr. Morton exposed the cervical vertebræ from the third to the seventh. The laminæ of the fifth were found to have been fractured, and they (with the spinous process) were removed by catching them with the forceps and cutting all attachments. The membranes were not opened, but appeared to be healthy, and when a weak faradic current was applied to the exposed surface, the other pole being on the left foot, decided muscular contractions were observed.

Respirations appeared to be better after the pieces of bone had been removed. The temperature went up in the evening to 104° , but was reduced by cold sponging.

Two days later the patient seemed to be in an improved condition. The pulse was good. He had some twitching of the muscles of the legs during the night. Bowels loose and involuntarily evacuated. The temperature was still elevated (about 104° F.). On the 18th it was noted that there was more movement of the muscles, which react to the electrical current. Sensation still lost and impressions referred to the neck. January 26, the patient spoke of feeling peculiar sensations in his legs. Anæsthesia unchanged, but motion in response to current was improving daily. Patient still had elevated temperature and had lost flesh. The emaciation continued and the strength failed, a large bed-sore formed over the sacrum and spine, which became gangrenous. Death from exhaustion occurred February 4, 1899, his temperature shortly before death was 108° .

At the autopsy the spinal cord was found to be much softened and degenerated at the level of the fifth and sixth cervical vertebræ; the remainder of the cord appeared to be healthy.

At the time of the operation the dura mater, at the bottom of the wound, seemed to be healthy, and it was not disturbed. The wound had contracted, and in large part had healed by first intention shortly after the operation.

DR. HOLMES recounted a similar injury, which had occurred under his observation some years ago, from diving into a shallow public bath. The patient lived two weeks, and died of the injury to the spinal cord. Recently, during his hospital service, a man was brought in who had fallen from the third story of a building and injured his cord, but there was no mark of external injury whatever. By careful examination it was determined that the injury was about the outlet of the fourth cervical nerve, causing paralysis of motion and sensation. Friends would not allow any operation, and the man died in the course of ten days; no autopsy was permitted.

DR. BURR said that there died, last summer, in Blockley Hospital, a man who had been treated by Dr. Morton some twenty years ago, at which time he had a fracture of the cervical spine,—cause unknown. He was paralyzed entirely in his limbs when sent to the hospital. When he came to Blockley, three

years ago,—this was some seventeen years after the injury,—he was able to walk and to use his arms. He had marked spasm in both legs; some slight trouble in passing water; marked rigidity in the neck, and some wasting about the back of the neck,—muscular wasting. He stayed in Blockley on account of Bright's disease, not on account of his fracture; he used to work in the wards, but finally died. At the post-mortem it was shown that one of the cervical vertebræ was locked over the one above; it had slipped over. The spinal cord was remarkably flattened; it was only about one-half as thick and as wide as it ought to have been. Still it had performed almost all the functions that it could have performed if perfectly normal.

DR. MORTON remarked that in this case the injury occurred in the spring of 1876, during the time of the Centennial Exhibition. While polishing the marble columns in front of the mint, the man fell from a scaffolding and struck his head.

DR. DEEVER said that he had seen a number of fractures of the vertebræ, in some of which he had done the operation of laminectomy. While it has not been attended by success, yet he felt it to be a perfectly warrantable procedure, as he had never known a patient to die from shock in his own personal experience. In the case of a man in the German Hospital, who met with a fracture of the upper thoracic vertebra, as demonstrated not only by palpation but by an X-ray picture, and was paralyzed, laminectomy was suggested, but was not accepted by Dr. Deaver. For several weeks he was completely paralyzed. But now he sits up; has perfect control of his arms; some little control of his legs, and control of his bladder. With that sort of experience—having had experiences not so favorable as that from operation—it makes one hesitate about doing an operation. He believed laminectomy to be a proper procedure; but that it promises most as an early operation,—that is, done immediately and not ultimately. Most of these injuries occur from extreme flexion of the spinal column. Such cases are not likely to give good results. In cases of direct traumatism, as the one Dr. Morton reported, operation would be more promising.

DR. HARTE agreed with Dr. Deaver that the time to operate on spinal injuries is in the beginning instead of waiting until some time had elapsed. He had done the operation of exposing the cord, for the relief of supposed pressure in the upper region of

the neck, twice in the last few years, but with unfavorable termination. Such cases all die in a very short time. But if surgeons could succeed in saving or restoring the function in one out of fifty cases, it would make the operation justifiable. Personally he was inclined to pursue a conservative course. Fractures of the cervical vertebræ are known to be extremely dangerous,—that is to say, the patients die very frequently within forty-eight hours or three days; very seldom they recover. The advisability of laminectomy increases as one descends the spine.

DR. WHARTON said that he had seen some operations of laminectomy for fracture in the cervical and also in the dorsal region, some undertaken early and some in which the operation was delayed several weeks, but in none of these cases had he observed decided improvement follow. In most of these cases it was found that the cord practically had been torn at the time of injury; the injury being produced by falls on the head or buttocks, causing violent flexion of the spine and rupture of the cord. He had seen a few cases in which conservative treatment was followed by good results. In one case a man was caught under a trolley-car and had a fracture in the second lumbar vertebra; this case recovered with apparently perfect motion; he had really very little paralysis at the time of admission. He has at the present time a little anæsthesia at the anterior portion of each thigh, rigidity, and distinct deformity in the seat of fracture, but, with these exceptions, he is in good condition.

DR. T. R. NEILSON had had experience with two or three cases of laminectomy. One was in a case of high lumbar fracture, another was middorsal, and the third was also dorsal. So far as the operation is concerned, his experience in these three cases quite agreed with that of the other speakers. He saw no immediate ill effects of the operation, and he did not think that under ordinary circumstances, certainly below the cervical region, the element of shock need be considered, on account of the great difficulty of diagnosis, in some cases, of spinal injury. If there is plausible reason to believe that there is fracture with displacement, then he saw no objection, and in some cases thought there was very distinct indication for laminectomy to be performed, but the great trouble is to determine what the lesion is that is to be dealt with. In the three cases that he had seen, the destruction of the cord was so great, so complete, that the operation

might just as well have been left undone, so far as the ultimate results were concerned. On the other hand, he had seen, like others, fracture of the spine, in which very fair ultimate results were obtained without operation, the patient living for a number of years, gradually recovering after many weeks or months following the injury, with more or less control of certain groups of muscles, perhaps all in a given limb or area. He recalled a case, in his wards at the Episcopal Hospital, of a young man about twenty, who had sustained an injury in the cervical region while wrestling. He was violently thrown in some way. There was paralysis from the clavicle downward, but he could detect no displacement. So he simply left the patient to take his course, watching him carefully, and using such medicinal treatment as was indicated to meet individual symptoms. The man recovered completely within a reasonable length of time, getting perfectly and absolutely well. He knew of cases, on the other hand, where an operation was done for just exactly such symptoms, and where the cord was found injured beyond all hope of repair. It is often impossible to know how extensive the injury is without exposing the site, and, therefore, the question is not merely how to operate or to determine the element of danger, but how to reach an accurate diagnosis.

DR. J. EWING MEARS detailed the case of a woman, who was admitted to the surgical wards of St. Mary's Hospital, suffering from an injury of the vertebral column, caused by a fall from the second story of her house. In this fall her back came in contact with a corner of the stone step in front of the house, which resulted in producing a fracture of the last dorsal and the first lumbar vertebræ. On examination, it was found that the patient was suffering from paraplegia as a result of the injury. Some days after her admission he performed laminectomy. Subsequent to the operation the patient showed marked symptoms of improvement, then he lost sight of the case.

He believed it was not only justifiable, but incumbent upon surgeons to interfere in these cases. Relief afforded to one patient is encouraging, and should induce surgeons to operate in all cases where possibly relief may be afforded. It is impossible to determine, of course, the exact extent of the lesions which may exist without such an inspection as an operation will afford. As has been stated, the operation *per se* is quite

devoid of danger, and therefore the patient is not subjected to very grave additional conditions. By repeated operations our knowledge will be increased, both with regard to diagnosis and the results of treatment.

DIFFERENTIATION OF VERTEBRAL SYPHILIS FROM POTT'S DISEASE OF THE SPINE.

DR. CHARLES W. BURR reported the following case: A single man, thirty-one years old, was admitted to the Philadelphia Hospital, August 3, 1896, complaining of loss of power in the arms and legs. He at first denied and later admitted having had syphilis. Five years before his admission to the hospital he fell from a low scaffold, striking the back and occiput. He was confined to bed five weeks on account of injuries to the chest, but had no paralytic or other spinal symptoms. One year later he was caught between two cars, bruising the chest and back, but was absent from his work only a few days. He continued in good health until the onset of his present trouble, in October, 1895. At that time his neck began to be stiff and his head became forcibly retracted. By December he was unable to move the rigidly retracted head at all. In May, 1896, he gradually began to lose power in the left arm, left leg, right arm, and right leg in the order named. He never had severe pain in the spine or extremities. For several months he has had difficulty in micturition, and frequently uses a catheter.

Examination showed complete loss of power in both upper arms, with some slight retention of movement in the forearms. He can flex and extend the legs while in bed, but can scarcely stand alone, and even when supported can walk only a few steps. The legs are stiff from extensor spasm and voluntary or passive movement makes them more so. The hands are contractured, the first phalanges being hyperextended, the others flexed. He can flex and extend the head a little, but cannot rotate it, apparently not because of palsy or spasm, but on account of a mechanical resistance to the movement. It is no longer retracted, but sits upright upon the neck. The back of the neck is full and rounded, and a firm, ill-defined, not very painful mass is present over and on either side of the cervical vertebræ. The skin is movable over it, but it seems to be attached to the bones beneath. Though there is ordinarily little pain in it, pressure upon it causes

great suffering. The pharynx is normal. There is no evidence of bone-disease in its posterior wall. The cervical glands are enlarged. The knee-jerks are very much increased, ankle clonus is present, and the biceps-tendon jerk is active on both sides. The muscle-jerks are present in the arms and legs, but much more marked in the latter. Tactile sensibility is preserved over the entire body. There are some spots of hyperæsthesia upon the legs, the position of which shifts from day to day. There is considerable disturbance of the temperature sense, his replies when touched with a warm or cold object being incorrect almost as often as they are correct. He apparently has no true appreciation of temperature. He complains—and this has been for several months, but after the onset of the palsy—of pricking and tingling sensations in the arms and in the legs below the knees. There is marked wasting of the muscles of the hands and forearms, none of the upper arms or legs. There are no cranial nerve palsies. The pupils are equal, moderate in size, and react well to light and with accommodation. He has great difficulty in passing water and is obstinately constipated. The thoracic and abdominal organs are normal. There is some cystitis; a little pus, a trace of albumen, but no casts in the urine. Upon the legs are syphilitic scars. He had no fever while in the hospital.

He was kept upon his back and given iodide of potassium and mercury, both of which he bore well. After several months he had improved so much that he was permitted to go out on parole. He did not return. The deformity of the spine had disappeared. He could walk well and use his hands fairly well. The deep reflexes were still increased, and there was still some wasting in the hands and forearms. He could micturate without trouble.

Part of the diagnosis was easy enough. He evidently had a cervical meningomyelitis. The combination of irritative and destructive symptoms proved this. The onset with retrocœlic spasm, followed by a wasting palsy of the arms, and a spastic palsy of the legs were enough to localize the lesion in the cervical region of the cord. The more important part of the diagnosis—namely, the primary cause of the nervous symptoms—was more difficult. The diagnosis of syphilis was made, not upon the nervous symptoms; it was only in small degree a conclusion

drawn from the results of physical examination, it was largely a happy guess based upon the history of a previous syphilitic infection. The mass in the cervical region was assumed rather than proved to be a gumma. The assumption turned out to be well founded and right. It might have been wrong. Only the course of events proved that it was not a malignant growth or inflammatory from tuberculosis.

Dr. Burr further remarked that to determine whether any given case of compression myelitis is tubercular or syphilitic is easy or difficult according to circumstances. In those cases in which a well-defined gummatous growth is visible and palpable, there need be no difficulty. In other cases, in which a syphilitic exostosis grows into the spinal canal and encroaches upon the cord, diagnosis may be impossible. In the very rare cases of syphilitic caries of the bodies of the vertebræ the bony deformity and the nervous symptoms may exactly simulate tubercular caries. There is no reason why they should not, for the nervous symptoms of Pott's disease are due largely to the meningitis which, in its turn, causes a myelitis, and it matters very little whether the irritation causing the meningitis is syphilitic or tubercular. Again, the bony deformity is a mechanical thing depending not at all upon the pathologic nature of the caries.

We are driven, then, to other grounds entirely upon which to base a diagnosis. Zasinski, who has collected quite a large number of cases of all types of syphilitic vertebral disease, concludes that primary bone tuberculosis does not occur in the adult, hence, if in an adult he finds angular deformity or other sign of Pott's disease without evidence of visceral tuberculosis, he assumes syphilis or a tumor. If he finds evidence of syphilis in other parts of the body, he excludes new growth. In any event, he employs the therapeutic test. Leyden lays stress upon the fact that syphilitic vertebral disease may have more than one primary focus, whereas tuberculosis is never multiple in the spine. The mode of onset and course of the nervous symptoms may be of some diagnostic value. Tubercular caries almost always begins in the bodies or intervertebral disks, whereas syphilis may begin anywhere, in the periosteum or in any part of the bones. It follows that the early nervous symptoms of tubercular disease are always or almost always dependent upon disease of the anterior part of the cord, are motor, and that though they may first

appear in one extremity they soon become symmetrical, whereas in syphilis any part of the periphery of the cord may be first affected, and if the lesion be a gumma or periostitis instead of caries of the bodies, the symptoms may be asymmetrical and aberrant for some time. Thus, in the case reported, palsy first appeared in one arm, then in the leg of the same side, then in the other arm, and last in the other leg. This would be a very unusual course in tubercular disease.

(1) Two days after the date of the foregoing remarks a patient, who had had a spastic paraplegia for many months, died, and a necropsy was made. He was about sixty years old. He had had a slowly on-coming spastic palsy of both legs with increase of the knee-jerks, ankle clonus and retention of urine, without anæsthesia. There was no deformity of the spine and no localized pain. Post-mortem the spinal dura was found thickened by inflammatory tissue on its outer surface, in the region of the tenth dorsal vertebra. It was somewhat adherent to the body of the vertebra. There was no inflammation of its inner surface, and the pia was not thicker than normal and was transparent. The vertebral body was somewhat carious, but not enough so to disturb its form. Macroscopically the cord seemed normal. There has not yet been time to make a microscopic examination of it. There were no evidences of tubercular or syphilitic disease in the thoracic or abdominal viscera. Death resulted from chronic nephritis. It seemed to Dr. Burr that the caries was tubercular, was primary in the spine, and hence is strong evidence against the opinion quoted above.

DR. G. G. DAVIS said that he was positive that he had seen primary tubercular disease of the bones of the spine in adults, and he would be unwilling to accept that as a diagnostic point,—that is to say, the occurrence of kyphosis in an adult without tubercular disease elsewhere as being proof of syphilitic disease of the spine. He certainly thought that in adults, in just the same way as in children, but not so frequently, tubercular disease of the bones of the spine develops, following, for instance, slight injuries, and they show a marked kyphosis.

DR. WILLIAM J. TAYLOR stated that he had had rather a large experience in these cases of spinal disease, and that he could only recall one instance where syphilitis could be considered as a probable cause. This was in a child of three, with a distinct

history of inherited syphilis, and an acute Pott's disease as well, but it was also impossible to eliminate entirely the question of tuberculosis. He had seen several instances of primary tuberculosis of the spine in adults where the possibility of a syphilitic taint could be thoroughly excluded.

DISLOCATION OF THE OS CALCIS AND SCAPHOID FROM THE ASTRAGALUS.

DR. W. B. HOPKINS presented a plaster cast of a foot and ankle in which a dislocation of the os calcis and scaphoid from the astragalus had occurred. He said that in describing dislocations it is on some accounts unfortunate that no fixed rule has ever been consistently adhered to, in naming the proximal or distal bone contributing to the displacement, as the bone dislocated. While the dislocation of any joint is more commonly named by the distal bone, such a definition is at times awkward and misleading. Thus to call an upward luxation of the acromial end of the clavicle a downward luxation of the scapula might readily be misunderstood, while in the dislocations about to be reported, the joint dislocated must be carefully specified in order to avoid confusion. An injury was described as above by Mr. George Pollock in a paper read before the Royal Medical and Chirurgical Society of London, entitled "Dislocation of the Os Calcis and Scaphoid from the Astragalus." While in this manner the injury is distinctly located, such a heading would easily escape observation in looking up references for a collection of data. As this latter consideration is very important in the titles of all subjects, to follow usage, without aiming at entire consistency, is perhaps the best alternative.

The case from which the plaster cast was taken (the man having been a patient of the Pennsylvania Hospital while the reporter was resident surgeon) has a history as follows:

J. D., aged thirty-six, a powerfully built, healthy man, while lowering a barrel of shellac from his wagon lost control of it, and rolling down the plank it struck both of his legs in front with great force. He had a compound fracture of his left leg. There was found great deformity of the right foot, consisting in a marked prominence about an inch and a half in front of the external malleolus, over which the skin was tightly drawn and which was easily distinguished as the smooth head of the as-

tragalus. The foot was markedly inverted, but the contour of its plantar aspect was normal. The patient was etherized and the plaster-of-Paris cast (Fig. 1) was expeditiously taken. A more careful examination verified the diagnosis, showing the astragalus normally articulated at the ankle, but dislocated outward from the os calcis and scaphoid. There was no fracture. The dislocation was easily reduced by forcible eversion of the foot and counterpressure with the thumbs upon the head of the astragalus. Both limbs were placed in a fracture-box, a fixed dressing being applied later on to the right foot.

A second case was admitted to the Episcopal Hospital in 1894. A man, aged forty-eight, had fallen from the rigging of a vessel to the deck, a distance of thirty feet, and had landed on his feet. The same deformity of the left foot as in that of the other case was observed, except that the head of the astragalus was not quite so prominent, nor was the inversion of the foot so complete. The articulation of the astragalus at the ankle-joint was undisturbed, and there was no fracture. The patient was etherized, and the dislocation reduced as in the other case, and with as little difficulty. A plaster-of-Paris dressing was applied. The patient made a good recovery.

Although in the paper by Mr. George Pollock, above referred to, thirty-two simple dislocations of this articulation of the astragalus have been collected, the injury is certainly a very rare one. Its occurrence depends upon the action of forces similar to, if not identical with, those causing the various fractures about the ankle-joint, which are among the most common of fractures of the lower extremity. The reduction, as stated in the two cases reported, was very easy, which would appear to be the exception and altogether contrary to the experience in most cases. An analysis of Mr. Pollock's table—that part of it relating to simple luxations—sufficiently demonstrates the extreme gravity of the injury. Six died, one recovered after amputation, three recovered after resection of the astragalus, eight recovered after unsuccessful efforts to reduce it, in one case the result was uncertain, and thirteen recovered after reduction. In his whole list, which includes compound as well as simple dislocations, of which fifty-five are tabulated, the results are not encouraging. The total number of reductions being only eighteen.



FIG. 1.—Showing deformity after dislocation of the astragalus at the ankle-joint.



FIG. 2.—Showing deformity after dislocation of the os calcis and scaphoid from the astragalus.

BACKWARD LUXATION OF THE ASTRAGALUS AT THE ANKLE-JOINT.

DR. W. B. HOPKINS presented a man, aged thirty-five years, who was brought to the Pennsylvania Hospital, December 22, 1898, for an injury received by being caught in shafting while attempting to slip a belting on a wheel. Besides a severe laceration of the scrotum, which laid bare the tunica vaginalis and the sac of an inguinal hernia, he had sustained a dislocation at the ankle.

The foot was inverted to nearly a right angle. The anterior border of the articular surface of the tibia could be plainly seen beneath the skin, while the trochlea of the astragalus could be felt behind the ankle-joint. A plaster cast was at once taken of the injured parts. (Fig. 2.) Reduction was accomplished unintentionally by simply lifting the foot from the table by the toes, while in the act of cleansing it. The luxation could, however, be reproduced without effort at will by gently forcing the foot backward. In studying the deformity consequent upon this dislocation, it is interesting to note that the marked inversion of the foot is caused by the tibia resting upon the slanting plane of the tarsus, corresponding to the upper surfaces of the neck of the scaphoid. As can be readily demonstrated upon the skeleton, this is the point on which the tibia would naturally rest in occupying its new position.

The limb was placed in a fixed dressing, which was removed in five weeks. The patient never had any pain or discomfort from the luxation, his convalescence being entirely uneventful, but his scrotum suppurated, and now, at seven weeks, is not entirely healed, though he walks on his injured foot with ease.

DR. DE FOREST WILLARD remarked that he had seen no cases of simple dislocation of the astragalus from the calcaneum, but he had seen a number of compound luxations with and without fracture, where it was necessary to excise a whole or a portion of the astragalus. Where the astragalus has been removed the results of motion at the ankle-joint are better than where it has been allowed to remain. The articulating face of the calcaneus coming up against the articulating face of the tibia makes a very good ankle-joint afterwards, consequently, in a case of compound dislocation, accompanied by fracture, removal is a desirable procedure.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

I. The Present Status of the Antistreptococcic Serum.

By F. J. COTTON, M.D. (Boston). The author, after an exhaustive review of the literature of the subject, formulates his conclusions as follows:

Probably no one will now contend that the antistreptococcic serum is, broadly speaking, effective against streptococcus infections. Beyond a doubt, a certain degree of passive protection is possible in the laboratory, and probably something of the sort is possible in man. There seems, in view of recent work, no ground for drawing sharp distinctions between alleged species of streptococci, and, though it would be a mistake to assume too close a parallel between the conditions of infection in man and in animals, yet probably a serum really effective in protecting rabbits against streptococci would afford some aid to the human organism in its struggle against a like infection. It is likely enough that this is the explanation of the temporary relief of symptoms so often noted. It does not seem that this represents a strong action against the infection, but it is something, and in many cases a very little may turn the tide.

This seems reason enough to give the serum further trial,—as a symptomatic treatment if no more. There seems to be no good reason against its use. Urticaria, erythema, joint pains, etc., are of not uncommon occurrence, but of no great moment. Abscesses at the point of injection, sometimes containing streptococci, are not rare, and would indicate care in using a bacteriologically tested serum. Bué and Thomson have thought the serum a cause of albuminuria, but this must be either unusual or slight, judging by reports.

If the serum is to be used in earnest, it should be used in considerable doses. Probably in many cases the dosage has been too small. To protect a rabbit against a ten times fatal dose needed two-tenths centimetres of Marimorek's serum; this is one-seven-thousandth the body weight, corresponding to about ten centimetres in man. The potency of different makes of serum varies, and they seem to lose notably by keeping. Hence, while there are no accurate data for dosage in man, yet the problem is not to protect against an infection, but to cope with an infection in full swing, and that with a serum of doubtful efficacy; the needed dose will probably be large, if anything is to be accomplished. The limit of dosage must vary, but the untoward effects above noted are not frequent, and plenty of cases have borne twenty-five-cubic-centimetre doses. In one case a total of 1030 cubic centimetres was given, though this in a case of some duration; there were no ill effects beyond a slight erythema.

There seems, then, some reason for continuing the use of the serum in cases of demonstrated streptococcus infection; care is needful in selecting the serum to be used; it should be used, if at all, in considerable amount; and, above all, until more evidence of its power is forthcoming, it should be used as an adjunct only, and never to supplant or modify other treatment of the case.—*Boston Medical and Surgical Journal*, February 2, 1899.

II. Points in the Arsenical Caustic Treatment of Cutaneous Cancers. By WILLIAM S. GOTTHEIL, M.D. (New York).

(1) The arsenious acid caustic treatment of skin cancers does not contemplate or depend upon the actual destruction of the new growth by the caustic.

(2) The method is based upon the fact that newly formed tissue of all kinds has less resisting power than the normal structure when exposed to an irritation and its consequent inflammation. Hence the former breaks down under an "insult" which the latter successfully resists.

(3) If, therefore, the whole affected area can be subjected

to the influence of an irritant of just sufficient strength to cause a reactive inflammation intense enough to destroy the vitality of the new cells, the older normal cells will survive.

(4) Arsenious acid of properly mitigated strength is such an agent, and its application causes an inflammation of the required intensity.

(5) It therefore exercises a selective influence upon the tissues to which it is applied, and causes the death of the cancer-cells in localities outside the apparent limits of the new growth, where there is as yet no evidence of disease.

(6) It is superior, in suitable cases, to any method, knife, or cautery, which requires the exercise of the surgeon's judgment as to the extent to which it is to be carried. That the judgment is often wrong, and necessarily so, is shown by the frequency of recurrence under these methods even in the best hands.

(7) It is applicable to all cutaneous carcinomata in which the deeper structures are not involved, and which do not extend far onto the mucous membranes.

(8) It is easy of application; it is safe; it is only moderately painful; and its results compare favorably with those obtained with other methods.—*Author's Abstract.*

III. Stitch-Hole Infection in Cutaneous Sutures. By DR. J. TROLLER (Basel).

(1) Cutaneous sutures are very frequently contaminated by bacteria, more especially the extracutaneous portion, but the subcutaneous loop is also infected in a relatively large percentage of cases.

(2) The best results are obtained by a thorough disinfection of the skin and the use of antiseptic dressings (antiseptic powders).

(3) Sutures not possessing the power of imbibition are much more sterile than others, such as silk and catgut. The best of these is aluminum bronze wire, which possesses antiseptic qualities.

(4) Such bacteria as are found on the sutures are chiefly those which make the skin their usual habitat. Infection of the subcutaneous portion comes from the skin; infection from the wound itself can only very rarely take place.

(5) In nearly half of the experimental cases where the subcutaneous portion of the stitch was found infected there was a manifest infection of the stitch-holes. Such results must be obviated by endeavors to obtain a perfectly sterile condition of subcutaneous stitches.

(6) Of the varieties of bacteria isolated, the staphylococcus pyogenes aureus and the streptococcus pyogenes are rather rare; others are the staphylococcus pyogenes albus and the micrococcus tetragenus.—*Beiträge zur klinischen Chirurgie*, Band xx, Heft 2.

IV. The Action of the Hollow-Tip Bullet. By PROFESSOR P. BRUNS (Tübingen).

The English troops in the Soudan campaign of 1898 were provided with a new style of bullet differing from that generally used in Europe since the introduction of the modern small-bore rifle.

The experience acquired in the recent colonial conflicts would seem to have given rise to the conviction that the bullet ordinarily used (lead core and complete outer jacket of nickel,—i.e., “full mantle”) do not inflict a wound of a sufficient extent, and are lacking in “stopping” quality. The new bullet is not the so-called “Dum-Dum” used by the English in recent Indian uprisings; in the latter there is a soft lead tip. It has not proved itself satisfactory as it lacks penetration, and its use has, moreover, been the subject of sharp criticism.

The following description of the newest English bullet is taken from the *London Lancet* of June 28, 1898:

“A new service bullet just adopted by the War-Office will be used for the first time in the Karthum expedition. Several million rounds are being sent out for the use of the infantry who

are going to Egypt. The reason assigned for the change in the service bullet is that the Lee-Metford, though it is more deadly at ten times the range of the old musket ball, does not disable an enemy so effectively as it is considered desirable. The case is elongated and so hard that soldiers have been known to go on fighting after half a dozen Lee-Metford bullets have gone through them, whilst the bullet itself has passed through two or three men consecutively, shock being sacrificed for penetration. The Dum-Dum bullet, now also superseded, came into use for the purpose of stopping the rush of hordes of fanatics, as it had the advantage of spreading out and breaking up whenever it encountered resistance; but there has recently been some discussion in France as to the propriety of remonstrating with the British War-Office, on the ground that it is contrary to the convention made with other European Powers in 1868. The new service bullet is the same diameter (.303), the same length (an inch and one-fifth), and the same weight (215 grains) as the Lee-Metford bullet, and fits all the service rifles and machine-guns in use by the British army. The case is of nickel, the base only being filled with lead. The conical end is left empty, and when it strikes the enemy burs, opens backward and lodges in the body, penetration being lessened and shock increased. The new bullet is spoken of as the 'man killing bullet' in contradistinction to the 'man penetrating bullet.' It is propelled with cordite, and has as much energy as the old Martini-Henry bullet of 410 grains had with the best gunpowder; whilst, as it is half the weight, the soldier is able to carry double the number of rounds of ball-cartridge. The new bullet is being manufactured in the Royal Laboratory, Woolwich Arsenal, by men and boys working overtime, at the rate of two million rounds of bullets a week, and if the test in the Khartum expedition proves satisfactory, a permanent stock will be kept on hand at the powder magazine at Woolwich."

Professor .Bruns conducted an extensive series of experi-

ments with this new bullet. His findings may be summarized as follows:

The wounding faculty of a missile fired by a given weapon and a given powder can only be increased by rendering it more easily deformed. Consequently, the extent of the wound inflicted is proportionate to the projectile's alteration in shape. In the modern rifle the entire covering of the leaden core of the bullet is made sufficiently resisting as to be only affected on striking a bone and only when fired at a comparatively short range. To the use of jacketed bullets must be given the credit of the occurrence of less gruesome wounds attending the employment of the small-bore weapon.

In attempting to increase the efficacy of the ordinary modern bullet, the tendency naturally was towards removal of the tip of the mantle, resulting in the so-called "Dum-Dum." These were used in the last Indian uprisings by the British, and at short range the wounds inflicted were frightful. Even simple wounds of the soft parts are extremely severe as the tremendous initial velocity quickly results in the "mushrooming" of the soft lead. To the softness of the lead tip is due its lack of penetration, which at short range is four or five times less than the "full mantle" bullet. They are also far inferior in ballistic quality.

The English War-Office doubtless had the above-mentioned defects in mind when it introduced the "new service bullet." Notwithstanding the hollow point, it is not inferior in ballistic quality to the eight millimetres model. As shown by von Bruns's experiments, the new bullet is more easily deformed than the ordinary jacketed projectile, but on account of the support to the tip given by the mantle, to a lesser extent than the "Dum-Dum." Consequently, at short range all injuries are much more severe than those inflicted by the conventional pattern. Wounds of hollow viscera containing fluid are of tremendous severity as the missile explodes with great force. Only the bony wounds can be compared as corresponding in intensity with those re-

sulting from the action of lead-tipped bullets, the injuries to the soft parts being much less severe. The experimental work demonstrated that the increased effectiveness of the new bullet only held good for distances of 400 metres for soft parts and 600 metres for bones.

In penetration the hollow-tipped bullet compares favorably with the ordinary type so long as no alteration in its shape is produced, the greater the resistance of the target, the more unfavorable the comparison.

The following examples are instructive:

Distance, 25 metres, dry deal block, "full mantle," no change, 100-110 centimetres penetration; hollow tip, slightly altered, 84 centimetres penetration; lead tip, markedly altered, 20 centimetres penetration. Same distance, dry beechwood, "full mantle," no change, 54 centimetres penetration; hollow tip, markedly altered, 14 centimetres penetration; lead tip, markedly altered, 12 centimetres penetration.

The gain in lateral effect must therefore constantly be obtained at the expense of penetrating power. The hollow-tipped bullet inflicts nasty wounds at short range, but is incapable of passing through four or five opponents or heavy covering. While such missiles may be of value in dealing with savage opponents, their usefulness in European warfare is questioned by the writer. If in the latter event an engagement were opened at 1000-1500 metres, a decisive result would occur so soon as the range was reduced to 500 metres; and even at this last distance the specific action of the hollow-tipped bullet has been proven experimentally to be wanting.

He may reasonably anticipate that, following the lines of the English improvements, there will be a renewal of efforts at increase of wounding capacity of bullets, and by following up this principle, efforts will doubtless be made to check the otherwise certain tendency to a further reduction of calibre.

The projectiles so far designed for military use, which differ

only in having the tip covered or exposed, allow only a choice between increased wounding power or increased penetration,—the effectiveness of the one being obtained at the sacrifice of the other. The choice, therefore, lays between the “man killing” or the “man penetrating” bullet. The severer wounds, however, are the result of an alteration in shape, and for this effect a high velocity is requisite, but it must be borne in mind that the velocity diminishes quickest in the first portion of the bullet’s flight, so that at 600 metres the final velocity is already reduced to half of the initial. The last-mentioned distance is the limit of effectiveness of the specific action of the bullet as regards its wounding power.

Bullets have recently been devised that are intended to undergo a change of form upon penetrating a living target without becoming shattered, and therefore retaining a considerable penetration. They are of the “full mantle” type, with a “cap” or “hood” of lead additional. The latter loses its shape on encountering an obstacle, while the hardened tip, remaining and intact, continues to accomplish its work. The result is a bullet-wound of a calibre exceeding that of the rifle, but with the gruesome mangling eliminated; it does not seem proven, however, that the soft lead does not have an explosive effect.

In what directions further modifications of the bullet question are tending remains for the future to show. The latest move of the English War-Office is of the greatest significance. It is to the interest of all, therefore, that an investigation concerning the workings and importance in military surgery of this new bullet should be undertaken by a disinterested party and submitted to public judgment.—*Beiträge zur klinischen Chirurgie*, Band xxiii, Heft 1.

ABDOMEN.

I. Division of Motor Nerves as a cause of Ventral Hernia following Extramedian Abdominal Section. By DR. P. ASSMY (Heidelberg). If ventral herniæ were simply the

result of a stretching of the cicatrix the following anatomical conditions should be observed:

The yielding scar should represent the external covering, the hernial covering,—the peritoneum,—whether free or adherent, should represent the hernial sac. The pillars of the hernial orifice should be represented by the edges of the rectus muscle on either side, if the original incision was through its substance, or if external to it, on the outside, by portions of the oblique and transversalis muscles. Or, if the incision was still further removed from the median line, these last-named muscles would be found on either side. Instead of the above conditions the following is the actual finding: The scar does not alone constitute the external covering of the hernia; we find, in addition, normal skin,—in other terms, the protrusion has gone beyond the boundary of the original hernia and involved the neighboring tissue. In operations for the relief of this condition it is customary to excise the edges of the ring, the tissue immediately adjoining the hernia being seemingly too atrophied to use. Till recently no systematic attempts seem to have been made to analyze the constituents of such tissues. A careful study, such as was made in a case in the Heidelberg clinic, by Dr. Assmy, will reveal conditions that may be summed up as follows: In extramedian incisions, parallel or nearly parallel to the linea alba, the terminal branches of the intercostal nerves supplying the rectus muscle are divided. There is no anastomosis with the nerves of the opposite side, and in all probability none with neighboring nerves, certainly not in the central portion of the muscle. Consequently, that part of the muscle distal to the severed nerve loses its innervation and undergoes paralysis and atrophy. In the further development of a hernia, the atrophic and hence unresisting portion of the abdominal wall is protruded in response to intra-abdominal pressure, just as the cheek is puffed out in unilateral facial paralysis. On the median side the scar loses its support as the atrophic muscles are useless.

When contraction of the oblique and transverse muscles occurs, there is naturally a giving way at this point where two layers of weakened tissue exist. In great increase of abdominal pressure there ensues a stretching at the border of the cicatrix as well as of the cicatrix itself, and by the adherence of the sheath of the muscle to the scar, more or less of the normal muscular substance becomes involved in the external protrusion. .

A series of experiments on animals accurately confirms the clinical experience.

In view of such studies one must conclude that in lateral laparotomy the hernia is due chiefly to a neurotic atrophy. More care must hereafter be employed in determining the site and direction of the abdominal incision that the least damage may be inflicted on the motor nerves.—*Beiträge zur klinischen Chirurgie*, Band xxiii, Heft 1.

CHARLES L. GIBSON (New York).

REVIEWS OF BOOKS.

THE AMERICAN YEAR-BOOK OF MEDICINE AND SURGERY, under the general editorial charge of GEORGE M. GOULD, M.D. Philadelphia: W. B. Saunders, 1899.

The department of general medicine contains an elaborate review of the recent literature of typhoid fever, with fair views of the workings of the tests of Widal and Elsner. The year's work on tuberculosis is carefully studied, and many reasonable and unreasonable suggestions are recorded, the latter illustrating admirably the valuelessness of unbalanced enthusiasm. The treatise on cardiac diseases is exceedingly valuable. The sections reviewing the studies of diseases of stomach, intestines, and kidneys are satisfactory records of much intricate experimental work in physical and chemical diagnosis.

Of special interest to us is the department of the work devoted to surgery. Here are set forth the advantages of the sterilization of instruments, dressings, and sutures by formaldehyde; the advantages and disadvantages of operating gloves of rubber, cotton, and silk; and many methods, old and new, of preparing the hands of the surgeon for operative work. Interesting cases of rare forms of tumors are recorded. Some non-operative measures for treating malignant tumors are given a hearing. It is interesting to note that the literature of the year regarding amputations is reviewed in less than one page. The twenty-seven pages devoted to anæsthetics include instructive reviews based on statistical articles dealing with thousands of administrations. These pages are worthy of the attention of every practitioner, in particular those who bear weighty surgical responsibilities. Records of gastric surgery, excepting those presented in Dr. Keen's Cartwright lectures, are reviewed hastily.

Extensive studies in the technique of intestinal surgery are

presented with sufficient detail to render the chapter of great practical value. There is less said concerning appendicitis than in any preceding volume of this series. Whatever is here is good. Statistics of standard hernia operations are offered and several recently devised procedures, aiming at radical cures, are detailed. We discover an increased number of surgical experiences with the liver, spleen, and pancreas. Considerable space is devoted to rectal diseases. A relatively large number of operations for aneurisms of large arteries are embodied in the account of the surgery of the vascular system. Several new methods of treating special forms of fractures are presented acceptably. Much new matter is reviewed in the pages given to the consideration of the spine. Six pages sum up the work of many skiagraphers. Gunshot wounds are too briefly considered.

The editors of the department of Obstetrics give more attention to pathology than to any other feature. Very little non-operative work is recorded by the gynæcologists.

The pages telling of general pathologic studies during the year are concise and exceedingly interesting, particularly on account of the considerable work in observing cellular changes recorded. Two beautiful full-page plates illustrate some of these phenomena.

The chapter dealing with *materia medica* is, as ever, excellent, and constitutes, for the general practitioner, one of the most helpful features of the volume.

Altogether, this Year-Book is most pleasing and satisfactory. We can record advances in the Year-Book as truly as its editors have found gains in the long list of medical sciences. It is a wise provision that general medicine and general surgery should be given nearly half the volume. Good judgment has generally been exercised in allotting space to each subject commensurate with its importance to the general worker. The index of this volume is nearer perfect than that of any preceding Year-Book. It is, perhaps, the most commendable feature of this excellent work.

CHARLES H. GOODRICH.

NOTICE.

THE SAMUEL D. GROSS PRIZE OF THE PHILADELPHIA ACADEMY OF SURGERY.

The Second Quinquennial Prize of One Thousand Dollars under the Will of the late Samuel D. Gross, M.D., will be awarded January 1, 1900.—The conditions annexed by the testator are that the prize “shall be awarded every five years to the writer of the best original essay, not exceeding 150 printed pages, octavo, in length, illustrative of some subject in surgical pathology or surgical practice, founded upon original investigations, the candidates for the prize to be American citizens.”

It is expressly stipulated that the successful competitor, who receives the prize, shall publish his essay in book form, and that he shall deposit one copy of the work in the Samuel D. Gross Library of the Philadelphia Academy of Surgery.

The essays, which must be written by a single author, in the English language, should be sent to Dr. J. Ewing Mears, 1429 Walnut Street, Philadelphia, before January 1, 1900.

Each essay must be distinguished by a motto, and accompanied by a sealed envelope bearing the same motto, and containing the name and address of the writer. No envelope will be opened except that which accompanies the successful essay.

The committee will return the unsuccessful essays if reclaimed by their respective writers, or their agents, within one year.

The committee reserves the right to make no award if the essays submitted are not considered worthy of the prize.

OBSERVATIONS IN THE STERILIZATION OF
CATHETERS AND BOUGIES, AND ON
THE PRESENCE OF BACTERIA
IN THE URETHRA.

By JAMES H. NICOLL, M.B.,

OF GLASGOW,

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THE results of certain observations, which have occupied much of my spare time during the past few years, are here given as so many statements of fact verified as fully as the difficulties surrounding them have permitted. No attempt is made to draw final conclusions on any or all of the points raised,—the sources of fallacy are too numerous, and often too obscure; and, as explained below, the observations are incomplete, and are still being carried on. No bibliography of the subject is included. In the course of the investigation I had partially compiled one. Two things led me to abandon as useless labor the effort to complete it. These were, in the first place, the contradictoriness of the statements of the various writers, and, in the second, the obviously second-hand order of many of these statements.

The observations detailed, therefore, are to be regarded as the expression of an attempt to reach the facts of the subject by an observer as far as possible unbiased by previous statements. They are not, however, as already stated, given without the knowledge that fallacies may be present. So many sources of fallacy have become apparent that it is highly improbable that there may not remain still others.

The investigation has followed two lines: (1) Into the possibility of sterilizing by one or other means the various forms of bougie and catheter in use. (2) Into the question of the presence or absence of bacteria in the urethræ, morbid and normal, into which in practice instruments have to be passed.

The results are given in semi-tabulated form. The cases are those of patients examined in the Western Infirmary, the Central Dispensary, the Children's Hospital, and private practice, and my own notes of the cases are much more full than the brief records produced here.

In the work I have been indebted for invaluable help to Mr. F. H. Riley, who has previously, in another matter ("The Etiology and Treatment of Chronic Enlargements of Lymphatic Glands," *Glasgow Medical Journal*, January, 1896), given me much assistance.

The Clinical Research Association, London, also have most carefully and exhaustively reported on a number of preparations and cultures submitted to them. To Dr. R. M. Buchanan, of the West of Scotland Clinical Research Laboratory, and to Dr. L. R. Sutherland, assistant professor of Pathology, Glasgow University, and to two other gentlemen whose names are not published, I owe hearty thanks for much valuable help. Finally, Dr. A. R. Ferguson, assistant pathologist, Western Infirmary, and Dr. Leslie Buchanan, of the Eye Infirmary, have lately been giving a large proportion of their time and skill to the completion of that part of the investigation which is still in progress. In the face of the very contradictory statements of various writers, it has been my endeavor, by submitting all doubtful matters to one or more of the gentlemen named,—all of whom have a wide and accurate knowledge of practical bacteriology,—to arrive at results which might be regarded as reliable. I thus feel a degree of confidence in the accuracy of the results stated, which dependence on my personal efforts alone could not have given.

PART I.

STERILIZATION OF BOUGIES AND CATHETERS.

With regard to the first part of the investigation—the sterilization of instruments—the following results were obtained:

Bougies.—Metal bougies may, of course, be sterilized by heat. They may also be sterilized by the same processes as are applicable to soft bougies, and observations on this point are quoted below.

Soft bougies—red, black, and yellow “gum-elastic”—will not stand heating by any method to a temperature sufficient for sterilization. This statement is founded on numerous tests which I have applied to instruments supplied by different firms in Britain, America, France, and Germany, and applies to dry heat, steam, and boiling in water or oil. Occasionally a bougie is encountered which will survive a single not too prolonged boiling or steaming.

Such an instrument is an exception, however, and but proves the rule, for repetition of the process is destructive.

Professor Albarran, some time ago, introduced soft bougies (and catheters) covered with caoutchouc, which are, or were, stated to stand sterilization by boiling. For these I made inquiry through instrument-makers in London and Paris, and was informed that they could be made for me, but were not now stocked, as their power of resisting heat was found to be easily exhausted. I have not therefore tested these, being influenced by the considerations that instruments—both troublesome to obtain and costly, by reason of being specially made to order, and of short life—were not, whatever their merits otherwise, likely to be much in use. The following observations were made only on the ordinary red, black, and yellow “gum-elastic” bougies of every-day use:

(I) *New gum-elastic bougies*,—red, black, and yellow,—of various shapes and different makers, were tested in solutions of carbolic acid and perchloride of mercury.

Soaking for fifteen minutes in carbolic, 1 to 20, or for half an hour in carbolic, 1 to 40, or for an hour in perchloride of mercury, 1 to 1000, renders the surface of nearly all of them so sticky that the towel adheres in the process of drying, and the bougie becomes covered with fluff.

If the bougie be permitted to lie for an hour or two in the air, this fluff dries, and may be readily wiped off.

After several soakings, however, the surface becomes dull and sticky and unfit for use. Occasionally a bougie is found which, for a time, will stand such treatment. This is the exception. The majority are affected as stated, and it is obvious that sterilization in this way is unfit for practice. In the first place, it is impossible to wait for an hour or more till the bougie is sufficiently dry to be rubbed smooth for use. In the next place, to employ it while still damp and sticky is to sacrifice a bougie, for if there be germs in the urethra they will become embedded in the sticky surface of the bougie in such a way that it is difficult to conceive of their removal or destruction by any process not destructive of the instrument. Finally, even granting that such a brief soaking will sterilize a soft bougie (and on this point I have not made sufficiently accurate tests to speak definitely), and that the average bougie may be used twice or thrice after it, the process is too costly for practice. Some other mode of sterilization is therefore necessary. Dr. Schimmelbusch, in his "Aseptic Treatment of Wounds," says: "It is important that it should be known that a smooth (red gum-elastic) bougie or catheter can be made externally free from germs by mechanical means, rubbing it with a piece of sterilized gauze and warm water."

To test this I made the following experiments:

(II) *Series of six soft gum-elastic bougies*, which had been in ordinary use for from six to eighteen months. After use in cases of stricture these were washed with tepid water and soap, rinsed in cold running water, and dried with thorough light friction by sterilized gauze. Each bougie was then rubbed on the surface of slightly acid agar, and on the surface of slightly alkaline agar

in tubes. Results: In one case, in an alkaline tube, on the fourth day, there appeared two small colonies, which proved to be a large white coccus, which was not definitely identified. In another alkaline tube, on the ninth day, there appeared a patch of penicillium. The other ten tubes remained sterile for over a month, the period during which they were under observation.

(III) *Series of six soft gum-elastic bougies*, soiled with pus from acute abscesses, washed with tepid water and soap, rinsed in cold running water, and carefully dried by friction with sterilized gauze. Three of these were rubbed on alkaline agar, and three were stabbed into neutral gelatine. Results: All six tubes remained sterile for a month.

(IV) *Series of six soft bougies*, used in cases of stricture, washed with tepid water and soap, rinsed in cold running water, and dried with soft white towels which had not been sterilized, but which had come fresh from the laundry, where they had been boiled in the course of cleansing. The process of drying was completed by rubbing the instrument firmly from hilt to point several times with a fresh portion of the towel. Each bougie was then rubbed on slightly alkaline agar and on slightly alkaline glycerine agar. Results: All the tubes remained sterile for a month.

(V) *Series of six steel, plated bougies*, used in cases of chronic gleet, washed with soap and water, rinsed in cold running water, and dried with towels fresh from the laundry in the manner above described. They were then rubbed on plates of slightly acid gelatine and on plates of slightly alkaline agar. Results: Four of the twelve plates developed penicillium. The others remained sterile for a month.

(VI) *Series of six soft bougies*, used in cases of gleet, washed with soap and water, rinsed in running water, and dried with towels which had been sterilized by steam. Each bougie was then rubbed on neutral glycerine agar and stabbed into neutral gelatine. Results: One of the glycerine agar tubes yielded a sparse growth, appearing on the fifth day. This was pronounced by one bacteriologist to be *bacillus coli*, and by another to be *proteus vulgaris*. The other tubes remained sterile for a month.

In the foregoing experiments the water employed for washing was the ordinary gravitation water of Glasgow. No

means were adopted for sterilizing it. The towels were from the laundry of the Western Infirmary and from two private laundries. The oil employed for lubricating was made up after the formula of Lund. The culture media were prepared in the usual way, and were kept previous to use for a time sufficient to exclude chances of impurity.

Conclusions.—It appears clear that ordinary careful washing of a soiled bougie, followed by careful drying with gauze or towel which has been sterilized by steam or boiled, may be relied on to render the instrument sterile. The results of the experiments above detailed are practically uniform, for in Series V the fact that four out of the twelve cultures developed penicillium, a non-pathogenic mould, is probably to be explained by the fact that Series V, unlike the others, necessarily consisted of plate cultures instead of tubes, plates being much less readily protected from aerial contamination. It seems, therefore, that it is unnecessary to have recourse to the use of carbolic or perchloride lotions which, as stated, destroy the instruments.

In practice there is a consideration which is of prime importance. Instruments must not be employed after their surface has become broken. Metal bougies on which the plating has become chipped or scratched, and soft bougies with chipped or cracked surface, offer sites for the lodgement of septic material, from which it is not easily dislodged without still further destruction of the surface.

Metal bougies may be replated. Soft bougies, however, once cracked, cannot be repaired, and have to be discarded, and their life is shorter than that of the metal instrument.

As indicated, treatment by carbolic or mercurial lotions is peculiarly destructive of them, and, by rendering the surface rough, defeats its own purpose.

Catheters.—*Metal catheters*, like metal bougies, may be readily sterilized by heat.

Soft Catheters.—The red “rubber” catheters, usually termed “Jacques,” which are composed of various compounds containing rubber, may be sterilized by boiling or

steaming. They may also be soaked for months in solution of carbolic acid (1 to 20) and perchloride of mercury (1 to 1000) without damage. An india-rubber catheter may also be used daily, and subsequently washed with hot water and soap, and put to soak in carbolic lotion for the remainder of the twenty-four hours for a period of six months without becoming unfit for use. These statements are based on ample, actual, and carefully noted tests which I have made, but which need not be here given in detail. Two things are worthy of note. In the first place, these statements refer to rubber catheters of a certain quality only. There are in the market catheters of red rubber composition, which may be of as good quality as, or better quality than, the others, but which rapidly deteriorate under repeated boiling. Certain firms supply these, and these only. In the second place, *all* rubber catheters ultimately deteriorate to some extent after repeated boiling, the change in some being in the direction of brittleness, in others of pulpiness. Prolonged and repeated soaking in strong antiseptics has very little effect indeed, even when long continued, in producing deterioration.

By actual experiments, I have satisfied myself that rubber catheters treated by boiling, efficient steaming, or soaking for four hours in the lotions above mentioned, are rendered sterile, both internally and externally. As, however, few, if any, will be inclined to doubt this, detailed records may be omitted.

Gum-elastic catheters—black, red, and yellow, of various forms and from various makers—have been tested as follows:

(I) *Soaking in Antiseptic Solutions of Efficient Strength.*—Gum-elastic catheters are affected by this in the same way as bougies. In short, and without detailing the tests I have carried out, while nearly all varieties will stand brief immersion, no catheter I have been able to obtain will stand lengthened or repeated soaking, such as is necessary for efficient sterilization. This method of sterilization is therefore, as in the case of bougies, impracticable.

(II) *Soaking in Carbolic Oil.*—This is in no way harm-

ful to gum-elastic catheters. At present I have lying in carbolized oil (1 to 40) five gum-elastic catheters which have been in it for over three months. They are in no way damaged. As a means, therefore, of preserving new catheters, or catheters previously sterilized, from aerial or other contamination it may be employed. As a means to be relied on for sterilizing soiled catheters, on the other hand, it fails. This is what might be expected in the light of Koch's experimental demonstration of the fact that antiseptic substances dissolved or suspended in oil are practically inert. To test the matter I made the following experiments:

(1) *Black gum-elastic*, No. 6 coudé catheter, of inferior make,—*i.e.*, with rough unfinished interior,—saturated with pus from a large perityphlitic abscess, and subsequently wiped externally and allowed to dry in the air for six hours. The catheter was then placed, end down, in carbolized oil (1 to 20), care having been taken that the oil had thoroughly displaced the air from the interior. It remained there eight days, at the end of which time it was removed onto sterilized gauze, and by means of a sterilized knife and forceps bisected longitudinally. The halves were then by means of the forceps thoroughly rinsed in warm water which had been sterilized by boiling. One-half was then pressed face down on the surface of neutral agar in a wide tube, and the other embedded in neutral gelatine. Result: The agar medium yielded a growth of bacillus coli and a small coccus. The gelatine yielded a growth of the same coccus. It may be observed that, on washing off the oil with the sterilized warm water, beads of dried pus could be seen plentifully adherent to the interior of the catheter, quite undissolved and unpenetrated by the oil.

(2) *Red varnished catheter*, No. 10, passed in a case of old prostatic cystitis and tied in for over four days. The instrument was then rinsed in warm water, wiped externally, and placed, end down, in carbolized oil. After sixteen days it was removed and treated exactly as was the catheter in experiment No. 1. Result: Both halves yielded on slightly alkaline agar a mixed growth which was not fully worked out

by subsequent culture, but which contained at least two germs,—bacillus coli and a diplococcus. Red varnished catheters are made quite unfinished and rough in the interior.

(III) *Turpentine, Alcohol, and Ether*.—Nearly all varieties of soft catheter are singularly tolerant of turpentine. I have immersed red, yellow, and black catheters for weeks in turpentine without their sustaining any damage. On the other hand, no soft catheter I have been supplied with will stand the action of alcohol or ether for more than a few minutes without softening and cracking of the varnish. As, therefore, alcohol or ether is required for the thorough removal of the turpentine before use, cleansing by this means is impracticable.

(IV) *Formol vapor* has lately been tried as a means of sterilization. Through the kindness of Dr. Kay, I, some time ago, obtained from Paris the most approved form of apparatus for the purpose. In it the catheters (or bougies) are placed on wire net-work shelves over a tray containing formol, and are shut in an atmosphere of formalin vapor by an air-tight cover for twenty-four hours or longer. With this apparatus I conducted the following tests:

(1) Catheter, No. 7, black, olivary, of inferior make,—*i.e.*, with rough unfinished interior,—saturated with pus from abscess of acute cellulitis, and dried for twenty-four hours. This was left in the metal case in the formol vapor (material supplied by a Glasgow firm, and employed according to the directions of two published articles) for forty-eight hours. It was then split lengthwise with a sterilized knife, and embedded in slightly alkaline gelatine, in which, within three days, appeared a plentiful growth of staphylococci.

(2) Catheter, No. 10, black, coudé, of inferior quality, tied in for over twenty-four hours in a case of old cystitis from prostatic retention. This was rinsed in warm water and at once placed in the apparatus over formol (material obtained from a London firm) for three days. It was then split, and the internal surface impressed in neutral gelatine, where a mixed growth of bacillus coli and a coccus developed.

(3) Catheter, No. 6, yellow, olivary, well coated internally, repeatedly employed by a patient with old cystitis from stricture, and after use held under the tap and laid away in a towel. This was placed in the apparatus over powdered trioxymethylene (obtained from, and used according to directions supplied by, the makers of the apparatus), and kept there for forty-eight hours. It was then split and embedded in gelatine, and yielded a growth of a coccus which at first appeared to be a staphylococcus, but which subsequently showed evidencé of fission in the manner of a diplococcus.

It is not necessary to detail certain other tests which I have carried out with the apparatus, and which have given very similar results. Unless there be some serious source of fallacy in my mode of procedure, there can be but little doubt that, as a method of sterilizing really dirty catheters, the process is quite unreliable.

The process is the most recently introduced method for sterilizing catheters and bougies. Its original claims to efficiency have been quoted and requoted by various enthusiastic writers. My results have been so absolutely disappointing that I should have felt tolerably certain there must be something wrong with my procedure, and should probably not yet have published these results but for one fact. I have recently found in the *ANNALS OF SURGERY*, August, 1896, a summary by Dr. Martin of the most recent experiments of the original manufacturer of the apparatus. The results of these experiments by no means bear out the early and very positive claims advanced for the method, and which have been so widely quoted. They correspond very closely with my own. The final results of the manufacturer's tests are summarized thus: "As the result of many experiments, . . . comes to the conclusion that formol and trioxymethylene are admirably adapted to the sterilization of bougies, but that in the case of catheters exposed to twenty-four or forty-eight hours' action there may be failure when small quantities of formol are employed. When the temperature of the surrounding atmosphere is low, or when the attempt is made to sterilize

small catheters with very fine lumina or irrigating cystoscopes. It is probable that all these instruments could be thoroughly sterilized by a more prolonged exposure. This, however, is not practicable. It is essential, therefore, . . . not to attempt the sterilization excepting with catheters of large calibre exposed for twenty-four hours, or catheters of fine calibre and simple cystoscopes which have been previously washed for forty-eight hours." The results of my tests would seem to indicate that neither for large nor small catheters is the process of any value; and Dr. Martin, in the article quoted, appears to be essentially of this opinion, for the directions given for the process are that the instruments "should be *carefully washed with soap and water within and without*, and dried as nearly as possible before sterilization, . . . then subjected to the vapor of formol for at least twenty-four hours, . . . When required for use, . . . taken out and immediately *submerged in weak antiseptic solutions*, biniodide of mercury, 1 to 25,000, answering very well." (The italics are mine.)

(V) *Heat*.—No variety of gum-elastic catheter, whether black, red, or yellow, will stand boiling, dry heat, or steaming in an ordinary sterilizer. This statement is based on a number of actual experiments which I have carried out with catheters of different varieties and makers.

These experiments need not be here given in detail.

Certain conclusions arrived at, however, may be mentioned. (a) Soft catheters are less speedily destroyed by heat than are soft bougies. This may be owing to the tubular form permitting of the escape of hot air and gases from the interior, and thus obviating the rapid blistering of the surface which occurs in bougies. (b) Not a few soft catheters will stand boiling or steaming, if not too prolonged. A few will even survive a second, and, at times, a third repetition of the process. Of all forms of soft catheter that which is most tolerant of heat is the old, red-varnished, curved catheter. These observations, however, do not invalidate the general statement that soft catheters are more or less rapidly destroyed by heat applied in any of the three ways specified.

Steaming the Interior of Catheters.—Various forms of kettle have been lately introduced, designed to drive steam from the spout through a catheter fixed on it, and thus sterilize the interior of the catheter. Various tests which I have carried out have led me to the conclusion that

(1) Under certain conditions the process is reliable as a means of sterilizing the *internal* surface of soft catheters. (2) Under only exceptional conditions can the process effect the sterilization of the *exterior* of a catheter. (3) When efficiently carried out the process tends, sooner or later, to be destructive of the catheter subjected to it.

With reference to the first conclusion arrived at I found that the conditions mentioned are two: (a) The apparatus must be properly designed. Four firms supplied me each with its own particular forms of kettle. All four were similarly tested in the following way: A catheter was accurately fitted on the kettle spout, and in the eye of the catheter was placed a delicate thermometer. Two of the kettles raised the mercury to the boiling point of water, and kept it there indefinitely, as tested by three different thermometers. Of the other two kettles one failed to raise the column to within 2° of boiling point, and the other failed to get the mercury within 3° of boiling point. The results varied imperceptibly with catheters of different calibre, and with tests of varying duration. (b) Sufficient time must be allowed for the steam to act. On this point I have made the following tests:

(1) *Black condé*, No. 8, saturated with urine containing bacillus coli and diplococci in prostatic cystitis. The catheter was dried in the air for twelve hours. Its exterior was carefully cleansed with warm water and soap, and then with carbolic solution (1 to 20), care being taken to prevent anything entering the interior. It was then efficiently steamed for thirty minutes, split, and embedded in slightly alkaline gelatine. Result: No growth occurred.

(2) *Yellow condé*, No. 10, employed in the same case, and afterwards treated in exactly the same way, and finally efficiently

steamed for two minutes, split, and embedded in neutral gelatine. Result: Sparse growth of bacillus coli in both tubes.

(3) *Red varnished catheter*, No. 10, employed in the same case, and subsequently subjected to the same treatment, and finally efficiently steamed for twenty minutes, split, and embedded in neutral gelatine. Result: No growth occurred.

(4) *Yellow coudé*, No. 12, employed in the same case, subjected to the same after-treatment, and finally steamed for twenty minutes, split, and embedded in slightly acid gelatine. Result: A colony of diplococci formed in the tube, containing one-half of the catheter. From the position of the growth I could not avoid the conclusion that it originated from the external aspect of the catheter. The necessity for preserving the interiors of these catheters from the action of soap and water, and the carbolic solution rendered the process of sterilizing the exteriors somewhat unsatisfactory.

(5) *Yellow coudé*, No. 11, employed in the same case, subjected to the same after-treatment, and steamed for one minute, split, and embedded in neutral gelatine. Result: Both halves yielded a growth of bacillus coli, and in the case of one-half it seemed clear that it first originated from the external surface.

In the face of this difficulty I attempted to test the matter in another way. A large, No. 16, black, olivary, gum-elastic catheter was fixed on the kettle, and in it were placed in succession six No. 1, black, olivary gum-elastic bougies along with a fine thermometer. The results got were as follows:

(1) Bougie smeared with purulent urine from a case of cystitis due to faecal fistula. (This urine swarmed with bacillus coli, diplococci, and staphylococci.) The bougie was not allowed to dry, but was at once placed in the catheter and efficiently steamed for thirty minutes. It was then removed, allowed to cool under glass, and embedded in neutral gelatine. Result: No growth occurred.

(2) Bougie treated in the same way, steamed for one minute, and embedded in neutral gelatine. Result: No growth occurred.

(3) Bougie treated in the same way, steamed for three min-

utes, and embedded in neutral gelatine. Result: Growth of bacillus coli, originating at two points, one and a half inches apart.

(4) Bougie treated in the same way, steamed for five minutes, and embedded in neutral gelatine. Result: No growth occurred.

(5) Bougie treated in the same way, steamed for ten minutes, and embedded in neutral gelatine. Result: No growth occurred.

(6) Bougie treated in the same way, steamed for fifteen minutes, and embedded in neutral gelatine. Result: No growth occurred.

A second series of tests was made. In this instance the bougies were roughened by friction with sand-paper, and the material used for soiling them was the pus from a large acute carbuncle of the neck, which contained staphylococci only. The results were as follows:

(1) Bougie steamed for one minute, and embedded in slightly alkaline gelatine. Result: Active growth of staphylococci.

(2) Bougie steamed for five minutes, and embedded in neutral gelatine. Result: Growth of staphylococci.

(3) Bougie steamed for five minutes, and embedded in neutral gelatine. Result: No growth occurred.

(4) Bougie steamed for five minutes, and embedded in slightly alkaline gelatine. Result: No growth occurred.

(5) Bougie steamed for ten minutes, and embedded in slightly alkaline gelatine. Result: No growth occurred.

(6) Bougie steamed for fifteen minutes, and embedded in neutral gelatine. Result: No growth occurred.

From such results as these, while it is difficult to speak dogmatically, it would appear that an exposure of ten to fifteen minutes should be sufficient in most cases. It may be well to add, however, that in the case of a catheter with rough, uncoated interior, which catheter has been tied into a bladder containing septic urine for twenty-four hours, and which has, in consequence, been permeated by septic material through, possibly, half its thickness, such steaming will probably not be efficient in sterilizing it.

With reference to the second conclusion arrived at,—viz., that under only exceptional conditions can the process effect the sterilization of the exterior of a catheter,—the facts observed were:

(1) In a number of instances with steam passing briskly through the catheter, and the thermometer in the eye registering boiling point, it is possible to hold, for an indefinite time, the catheter in the hand.

(2) In the case of five different varieties of catheter I performed the following test: Against the catheter was placed the bulb of a delicate surface thermometer. The catheter and thermometer were then tightly rolled in many folds of lint, with layers of water-proof intervening, the ends being left open. The catheter was then attached to the kettle and steamed. Results: The highest temperature attained, even under these conditions, was 209° F. (with a black French coudé).

With reference to the third conclusion arrived at, it may suffice to say that in this process, as in others, the resisting powers of catheters vary greatly. The majority are temporarily softened and rendered more or less dull on the exterior by an exposure of fifteen minutes. Some do not recover, or but partially recover, their stiffness and lustre.

With an exposure of twenty to forty minutes many become blistered and distorted, and after one or two repetitions of the process a number are rendered entirely useless. It is a somewhat striking fact that those varieties which most require sterilizing by steaming stand it best, while those which have least need of it are most easily damaged by it.

Those well-made catheters, for instance, in which the interior is coated as well as the exterior, are apt to suffer from even a brief steaming, the internal coating cracking and curling up, while catheters of inferior make with rough uncoated interiors suffer no material damage till the process has continued sufficiently long to affect the external coat. Certain catheters appear to be quite unaffected by steaming. I have in my possession a red-varnished catheter and a black gum-

elastic one, both of which have been steamed for not less than fifteen minutes on upward of thirty occasions, and which appear in no way the worse. These, however, are exceptions.

(VI) *Washing with Soap and Water*.—The following series of six catheters was treated in the following way: After use each was washed with warm water and soap, rinsed in fresh warm water, and held under the tap for five minutes by the clock while a full stream of water flowed through. It was then dried with a towel fresh from the laundry, and thoroughly shaken while completely enveloped in the towel, and subsequently placed to dry for twenty-four hours under glass, with precautions against any possible contamination.

It was then split lengthwise with a sterilized knife, and the two halves were embedded in neutral gelatine. The results obtained were:

(1) Black, No. 10 coudé, which had been tied in for twenty-four hours in a case of old prostatic cystitis. Result: *Bacillus coli*.

(2) Red varnished, No. 8, catheter, which had been used daily for three months by an old prostatic with putrid urine. Result: Cocci arranged as staphylococci and as diplococci.

(3) Catheter coudé, No. 12, passed in case of recent gonorrhœa in patient with old prostatic retention. Result: No growth.

(4) Yellow, olivary, No. 10, catheter, tied in for twenty-four hours in case of old stricture and cystitis. Result: *Bacillus coli*.

(5) Black coudé, No. 9, which had been used daily for a week in a case of chronic prostatic retention. Result: A small coccus, which was not definitely identified.

(6) Black coudé, No. 6, passed in a case of old prostatic retention with recent hæmorrhage. Result: Diplococci.

These experiments were among the earliest I carried out, and at that time I had not become fully impressed with the difficulties in the way of arriving at reliable conclusions by such tests as the foregoing. A number of tests which I subsequently made gave such varying results that it would serve no useful purpose to reproduce them all in full here. What

follows, therefore, has reference to three methods only of cleansing soft catheters.

(VII) *Douching with Carbonate of Soda Solution*.—The following series of catheters was, after use, treated thus: Each was washed with warm water and soap, thoroughly rinsed in fresh, warm water, repeatedly douched through by means of a sterilized six-ounce syringe with 5 per cent. solution of carbonate of soda used as hot as the hands could bear it, and finally again rinsed in warm water and put to dry for twenty-four hours or longer under glass, with precautions against any possible contamination. Each was then split aseptically, and the halves embedded in neutral gelatine. The results were as follows:

(1) Black, No. 8, olivary catheter, which had been several times passed in a case of cystitis due to gonorrhœa. Result: *Bacillus coli*.

(2) Black, No. 12, coudé, which had been employed for a month twice weekly by a patient suffering from prostatic retention. Result: No growth occurred.

(3) Yellow conical, No. 6, catheter, tied in for twelve hours in a case of cystitis from stricture. Result: A growth of a diplococcus.

(4) Red varnished, No. 10, catheter, taken from the collection of a medical man who had repeatedly used it in cases of retention from various causes. Result: A growth resembling bacillus coli, but subsequently found to be *proteus vulgaris*.

(5) Yellow, No. 10, coudé, employed as a vesical drain in a case of vesico-vaginal fistula and cystitis for twenty-four hours. Result: No growth.

(6) Black, No. 8, coudé, employed daily for over two weeks by a patient with prostatic retention. Result: A growth of bacillus coli.

(VIII) *Douching with Warm Soda Solution and with Carbolic Solution*.—The following series of six catheters was, after use, treated thus: Each was washed with warm water and soap, rinsed in fresh warm water, repeatedly douched in the manner above described with hot 5-per-cent. soda solution,

and finally repeatedly douched with 5-per-cent. carbolic solution. Each catheter was then enveloped in a towel fresh from the laundry and well shaken, and put to dry under glass for twenty-four hours. It was then split aseptically, and each half was embedded in natural gelatine. The results obtained were:

(1) Black conical, No. 12, catheter, saturated with pus from a case of acute cellulitis. Result: No growth occurred.

(2) Yellow, No. 9, coudé, used daily for over a fortnight in a case of prostatic retention with putrid urine. (N. B.—This catheter was kept in boracic solution when not in use.) Result: No growth occurred.

(3) Harrison's black elastic-gum "whip" catheter, No. 10, French, which had been passed in a case of old stricture with purulent cystitis. Result: No growth occurred.

(4) Black coudé, No. 8, tied in for twenty-four hours in a case of acute retention in a patient with old prostatic obstruction and cystitis. Result: Growth of diplococci.

(5) Red varnished, No. 10, catheter, tied in for about eight hours in a case of old prostatic retention and cystitis. Result: No growth.

(6) Black olivary, No. 10, catheter, which had been used daily for five days in a case of prostatic retention and cystitis. (N. B.—This catheter had been simply washed in warm water, held under the tap, and then wrapped in a clean towel when not in use.) Result: No growth occurred.

Several of these catheters were distinctly damaged by the treatment. No. 2, which was coated internally, was roughened both internally and externally. No. 3 was rendered more or less dull and rough, and No. 6 became permanently soft and more or less dull and rough.

(IX) *Douching with Soda Solution and with Perchloride Solution.*—The following series of six catheters was treated in every way as was the preceding series, except that for the carbolic solution there was substituted perchloride of mercury solution, 1 to 1000. The results obtained were:

(1) Red varnished, No. 10, catheter, taken from a bladder the seat of cystitis of unknown origin, into which it had been tied for five days. Result: A vigorous growth which proved to be a mixture of diplococci and staphylococci. (N. B.—On splitting this catheter several small phosphatic concretions were found adherent to its internal surface.)

(2) Black, No. 8, conical catheter, which had been passed four times in two days in a case of gonorrhœal cystitis. Result: No growth. (N. B.—This catheter had been kept in perchloride solution, 1 to 10,000, when not in use.)

(3) Black coudé, No. 12, used in case of acute retention in old prostatic obstruction and cystitis. Result: No growth.

(4) Black coudé, No. 12, which was soaked for twelve hours in the fresh pus from a large fetid abdominal abscess, probably perityphlitic. Result: *Bacillus coli*.

(5) Yellow, No. 10, coudé, employed daily for a week by a patient with old prostatic obstruction and cystitis. Result: No growth. (N. B.—This catheter was simply washed with soap and water, held under the tap, and wrapped in a clean towel when not in use.)

(6) Yellow, No. 8, coudé, which was new and had been douched with water which had been boiled. During an hour it was used in four different cases of partial retention, all of which presented more or less cystitis, and in all of which regular catheterism was a necessity. After each of the first three cases the catheter was washed with soap and water and held under the tap, and finally dried by shaking while fully enveloped in a fresh towel. Result: No growth.

Catheters Nos. 2 and 6 of this series were rendered dull and more or less rough on the surface, and No. 2 was also much softened.

In all the foregoing tests applied to catheters the water employed for washing and making solutions was, unless otherwise specified, the gravitation water of Glasgow without the adoption of any means of sterilization. The oil used for lubricating the instruments before use was unmedicated olive oil sterilized by heat, and employed very sparingly. In several of the culture tests penicillium developed. As, however, this

is known to be due to aerial or other accidental and secondary contamination of the media, detailed notes of its occurrence have been omitted. In making the culture tests less than half the length of each instrument was employed, in order to avoid the use of excessively long tubes and very large quantities of media. The half tested was in all instances that including the eye.

Conclusions regarding the Sterilizing of Catheters.—In the matter of the sterilizing of bougies the results of the various experiments are clear, and the conclusions arrived at would appear therefore so far definite, and have been formulated above with little, if any, hesitation.

With reference to the sterilizing of catheters this is not so. It is obvious that in the results of the experiments detailed above there are anomalies and a lack of uniformity which render any attempt to formulate general conclusions of comparatively little value. Of the different possible causes of this lack of uniformity several are clear. These are mainly three: (a) The kind of catheter tested; (b) the previous treatment of the catheter tested; (c) the medium inoculated.

(a) *The Kind of Catheter tested.*—The various soft catheters in the market present the widest differences in quality and finish, and particularly in the finish of the interior and of the eye. I have split several specimens of the catheters supplied me by each of upward of twenty firms. For various reasons it is undesirable that I should here give specific details of this examination. So much may, however, be said. There are firms whose catheters are what they are guaranteed to be,—viz., as well coated and as smooth internally as externally. Such firms, however, are in the minority, and are not confined to any one country.

Certain of these firms supply these specially well-made catheters alone, others supply them only when specifically asked to do so, while many firms do not supply them at all, whatever their assertions may be. As already mentioned, it would appear that it is in many instances, though not invariably, the case that the more rough and unfinished the cath-

ter the better does it withstand damage from vigorous methods of sterilization. For instance, the old, red-varnished, curved catheter is, as a rule, the most rough and unfinished soft catheter obtainable. At the same time it will stand repeated steaming internally, somewhat prolonged immersion in strong carbolic or perchloride solution, and even fairly prolonged boiling. On the other hand, highly finished catheters, the interior of which is as accurately coated and as smooth as the exterior, tend to suffer speedily from internal steaming, immersion in antiseptic solutions, and even vigorous syringing with soda or antiseptics, if at all concentrated.

With reference to the bearing of the finish of the interior on the matter of sterilization by various methods as tested by culture experiments, it is obvious that it may introduce serious error into any attempted generalization.

If, for example, in the treatment of a case of purulent cystitis there be used two catheters, the one accurately coated, smooth, and glossy internally, and the other quite unfinished internally, it is evident that the first may be possibly rendered aseptic by washing with warm water and soap and douching with some antiseptic, but that such treatment may prove quite inefficient in respect of the second in which the purulent urine in its passage has soaked into the uncovered silk or linen web forming the skeleton of the instrument.

(b) *The Previous Treatment of the Catheter tested.*—A certain number of the tests quoted were carried out with catheters which had been in use in septic cystitic cases for days or weeks. It is obvious that the results obtained by a given method of sterilization carried out in the case of a catheter passed nightly by a prostatic cystitic patient, who carefully washes his catheter and lays it aside in a weak antiseptic solution in the intervals, can form no criterion by which to judge of the effect of the same method of sterilization as applied to the same catheter employed nightly by a patient in a similar condition, who merely wipes his catheter after use and carries it in his pocket or stores it in the commode till he next re-

quires its help. To further quote illustrations appears unnecessary.

(c) *The Medium inoculated*.—How far exactly this may introduce sources of fallacy is difficult to say. That it may be capable of vitiating the results of a whole series of tests I know from experience. Comparatively slight alterations in reaction of a medium and alterations in its constitution would appear to be capable of preventing or promoting the growth of certain organisms, and thus leading to erroneous conclusions. The subject is one of enormous difficulty, and I would desire to speak with much reserve in the mean time. As indicated below, Drs. A. R. Ferguson and Leslie Buchanan are kindly investigating the matter with me at the present time.

Those three sources of fallacy, with others of minor importance, have been so obvious in the experiments above detailed, as well as in others I have conducted, that anything further in the way of comparison than the comments and conclusions I have indicated under each method of sterilization tested would appear unwise.

The metal catheter and the soft, red, rubber composition, or Jacques's catheter, may be readily and certainly rendered sterile for an indefinite number of times either by boiling or by washing and immersion in sufficiently powerful antiseptic solutions, and this without sustaining damage.

With regard to the sterilization of all forms of "gum-elastic" or "varnished" catheter, it is, perhaps, not too much to say that, while there are various methods which are not, when repeated, destructive of the catheter, and which in the way of asepsis of the catheter offer a "reasonable degree of security," there is no method which is entirely reliable.

Further, as my experiments seem to indicate, it may also be said that there are reputed methods of sterilizing catheters which, when accurately tested, fail to justify the faith placed in them.

For practice I have formulated for myself certain rules:

(1) Avoid, as far as possible, the employment of catheters. In cases of stricture, for instance, it can only be very

exceptionally indeed that the use of a catheter is called for. Bougies, metal or soft, which are readily and certainly sterilized, will do all that is necessary.

(2) When a catheter must be employed, use, where possible, a red rubber Jacques's catheter in preference to a gum-elastic or metal one. In such cases as retention due to atony, spinal paralysis, reflex nervous effects, and other causes, and in many cases of prostatic retention, a red rubber catheter answers quite as well as a gum-elastic or varnished instrument, and is as readily sterilized by boiling or immersion in antiseptic solution as is a metal one.

(3) In cases where the use of a catheter is necessary, but in which a red rubber instrument fails to pass and something stiffer must be employed (as, for instance, in many cases of prostatic retention), the use of metal catheters, especially by the patient, does not commend itself as a measure free from grave risk of injury to the prostate or urethra. One has therefore to fall back on gum-elastic catheters.

In such cases, if the urine be very septic, I destroy any catheters I have employed. If the urine be not very purulent or offensive, I subject the catheters used to external washing with soap and water, and then with antiseptic solutions, followed by internal steaming. Those which survive I retain.

For those cases where the regular use of a gum-elastic catheter is necessary the patient is supplied with a catheter with well-finished interior. After use he thoroughly washes it, holds it under the tap for a few minutes, and then lays it aside in a dish of boracic, weak perchloride, or other weak antiseptic solution. I do not believe that this primitive treatment offers more than a "reasonable chance" of asepsis, but I know, from experience, that it is useless to expect an average patient to carry out anything more elaborate in the way of cleaning.

Moreover, when a prostatic patient has reached the stage of regular catheterism, with all its risks of septic cystitis and vesical atony with their grave sequelæ, it comes to be a

question for his medical adviser whether his condition warrants an operation for the radical cure of his trouble.

Some years ago I had constructed the glass tubes or bottles figured in the illustration. They are made with either metal or rubber stoppers. In these I store and carry catheters for use. Any catheter is simply washed and held under the tap and laid aside (or carried home wrapped in a towel or gauze) for sterilization before it is replaced in the glass receptacle.

For prostatic patients who either decline operation or are not fit subjects for it, and who therefore must use a catheter regularly, I have, on the suggestion of Mr. Mansell-Moulling, had these glass receptacles fitted with a metal handle (see illustration). By means of this they may be hung on the bed or in the wardrobe.

Filled with an antiseptic fluid they are at hand for the catheter after use, and when emptied of fluid may be used for storing the catheter while travelling.

The antiseptic fluid will vary in strength according to the kind of catheter employed, it being necessary to employ weak solutions for gum-elastic catheters, while red rubber catheters will stand anything.

PART II.

URETHRAL BACTERIA.

The second part of the investigation—viz., that into the presence or absence of bacteria in urethræ, morbid and normal, into which in practice instruments have to be passed—I was led to undertake by the discussion which followed a paper which I read before the Glasgow Medico-Chirurgical Society in November, 1893, and which was subsequently published in the *Glasgow Medical Journal*. In that paper and in the discussion which followed, in arguing for the employment of soft bougies (and catheters) in preference to metal ones in cases of urinary retention, more particularly in cases of tight or tortuous stricture, I expressed the conviction that soft

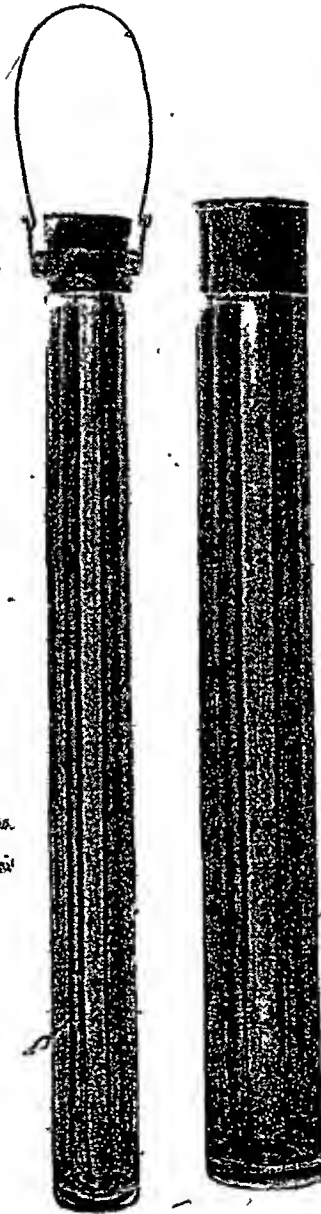


FIG 1.—Aseptic storage bottle for catheters.

bougies could be as readily rendered sterile as could metal ones; that the same might be claimed for red rubber catheters, while gum-elastic catheters, though not so readily or certainly sterilized, might, when of good quality, by a combination of washing and internal steaming, be rendered sterile for a certain number of times after use. These statements, based on previous practical experience, are, I venture to believe, fully borne out by the more formal experiments I have since then conducted, and which are published in the first portion of the present paper.

In the paper of 1893 I adduced evidence of the change of opinion in favor of soft as against hard instruments, which, originating in France, and led by Sir Henry Thomson in this country, and by American surgeons, has within the last twenty years largely revolutionized practice in cases of stricture and of urinary retention generally: and I pointed out that in Scotland, while soft instruments are now used for prostatic retention and for retention from vesical paralysis and atony, there is a decided tendency to retain the use of metal instruments in cases of stricture.

The reason for this somewhat illogical use of metal instruments in stricture, while soft instruments are employed for prostatic and spinal retention cases, appears to lie mainly, if not solely, in the belief that soft instruments are less readily sterilized than are metal ones. That, as regards bougies (the instruments then under discussion) at least, this is certainly not the case the foregoing experiments would seem to indicate, and my opinion to this effect I stated at the meeting and in the paper referred to.

I further drew attention to the point that even, for the sake of argument, granting this view to be correct, it represents one side only of the question. In a case of tight stricture the condition of the channel through which the instrument has to be passed is of as much importance as the condition of the instrument, in certain cases probably of more importance; while in all cases demanding instrumental treatment the nature of the fluid in the bladder and the character

of any moisture or discharge present in the urethra may constitute features in the case of graver import than the condition as regards asepsis of the instrument employed.

In the paper and discussion referred to two points were drawn attention to, (a) the condition of the gastro-intestinal tract from mouth to anus. This is constantly occupied by the most septic contents without detriment to the health of the patient. The most trivial wound of any part of the mucous membrane, however, is apt to result in the production of septic mischief, frequently of the most rapidly fatal kind. (b) The fact that the larger number of strictures are not mere annular constrictions, but long, tortuous, narrow channels, often with eccentric openings, and with sharp angles and curves, of the direction and position of which the surgeon is ignorant. Along such a channel it is manifestly never easy, and is frequently impossible, for the surgeon to pass a rigid metal instrument of a calibre of the necessary smallness without abrading the surface of a curve or ploughing up an angle, even though he may successfully ultimately enter the bladder without the formation of an actual false passage. Through such a channel, on the other hand, fine or small-sized soft instruments, held tightly between finger and thumb, may be wriggled without damage, the pliable point and neck adapting themselves mechanically to the curves and angles of the channel, anything like abrasion or tearing being impossible.

Succeeding the foregoing, the following passage occurs in the paper: "Let it, for the sake of argument, be assumed for the moment that this statement [*viz.*, that soft instruments are less readily or certainly rendered pure than are metal ones] is absolutely true in fact, it will not be difficult to prove that the argument based on it, even if its truth be assumed, is specious. . . . Given a case of tight, tortuous, or oblique stricture, with swollen, congested surface, covered with mucopurulent, gleety discharge, and with possibly cystitis and purulent urine in addition. Take to treat it a soft instrument, filthy and septic. In the majority of cases you can gently wriggle this through, and that without abrading any part of the mucous membrane, thus dilating the stricture and giving

free exit with the urine over the intact mucous membrane, not only to anything septic you may have introduced, but to the discharge in the urethra and the pus in the urine. Take, on the other hand, a small No. 1, 2, or 3 steel bougie or catheter, carefully sterilized, and in passing that through make but the slightest abrasion, and you establish a condition of affairs in which it is not your fault if septic mischief does not ensue. . . . What I have for the moment admitted for the sake of argument, however, I do not in any sense admit as an actual fact,—namely, that soft instruments, when intelligently managed, tend more to be septic than metal ones.”

How far these statements of opinion, based at the time when they were made on general observations, are borne out by specific investigation may be gathered as regards the instruments from the records of the experiments detailed in the first portion of the present paper. How far they may be accepted as regards the urethra may be to a great extent gathered from what follows, though, as previously mentioned, the investigation is not yet completed.

Series of twenty-four cases of stricture examined in the dispensary and wards of the Glasgow Western Infirmary, in the Glasgow Central Dispensary, and in private practice. Reproduction of detailed notes of these cases would serve no useful purpose. They were cases of ordinary urethral stricture coming for treatment either on account of acute retention or in the course of treatment by gradual dilatation. All had had instruments passed by various people on occasions previous to that on which the examination was made. The media inoculated were gelatine, agar, and glycerine agar. The procedure in all cases was the same. Before passing an instrument the meatus was cleansed with carbolic lotion (1 to 40) and dried with sterilized gauze. A pair of sinus-forceps, sterilized in the flame of a spirit lamp, was then passed into the urethra to the extent of about an inch and opened. Between the blades, and therefore out of contact with the urethral orifice, a stout platinum wire with a looped end, carefully sterilized in the flame, was passed into the urethra. The distance

to which this was passed varied from two to eight inches in different cases. In withdrawing it care was taken to keep it between the blades of the forceps, and therefore free from contact with the meatus, and inoculation of the medium was at once made.

The results were as follows:

CASE I.—*Bacillus coli*.

CASE II.—*Bacillus coli*.

CASE III.—No growth. The patient was not seen again.

CASE IV.—*Diplococcus* and *bacillus coli*.

CASE V.—No growth. Three weeks later a second inoculation test yielded a growth of *diplococcus*.

CASE VI.—*Diplococcus*.

CASE VII.—*Diplococcus* and a *staphylococcus*.

CASE VIII.—*Bacillus coli*.

CASE IX.—*Bacillus pyogenes foetidus* and *staphylococcus aureus*.

CASE X.—No growth. Patient not seen again.

CASE XI.—*Bacillus coli*.

CASE XII.—*Diplococcus* and *staphylococcus aureus*.

CASE XIII.—No growth. Eight days later a second inoculation test yielded also a negative result.

CASE XIV.—*Diplococcus* and *bacillus coli*.

CASE XV.—Large white coccus growing freely. Several secondary cultures were grown, and the growths submitted to three bacteriologists, but no definite decision was arrived at.

CASE XVI.—*Diplococcus* and a *staphylococcus*.

CASE XVII.—Growth of cocci. Culture accidentally destroyed before the germ had been identified.

CASE XVIII.—*Bacillus coli*.

CASE XIX.—*Bacillus*, investigated by secondary cultures, and variously pronounced to be *bacillus pyocyaneus*, *bacillus subtilis*, and *proteus vulgaris*.

CASE XX.—No growth. A second inoculation test, a week later, yielded a *staphylococcus*.

CASE XXI.—Large white coccus not definitely identified.

CASE XXII.—*Diplococcus* and *streptococcus pyogenes*.

CASE XXIII.—*Diplococcus* and *bacillus coli*.

CASE XXIV.—Coccus arranged as a *streptococcus*.

In the foregoing series of tests the media were prepared in different places and by different people. No accurate record of the reaction was kept. The composition and reaction of the media may have, as further research has taught me, a very decided effect on the results of inoculation tests. I have in my possession records of inoculation tests recently made which clearly demonstrate this. Two instances may be given: (1) T. H., aged two years, operated on at the Children's Hospital for tubercular disease of the metacarpus. While under chloroform the urinary meatus was cleansed and inoculations made from the urethra on acid agar and on alkaline agar. The alkaline tube yielded a luxuriant growth of a large diplococcus, while the acid tube remained sterile. Secondary inoculations were made from the growth in the alkaline tube into (a) the original acid tube, (b) a fresh acid tube, and (c) a fresh alkaline tube. Tube (c) yielded a vigorous growth of the same diplococcus, while (a) and (b) remained sterile. (2) M. A., aged thirty-seven, operated on for varicocele. While under chloroform the meatus was cleansed and inoculations made in neutral glycerine agar, which yielded a mixed growth of a diplococcus and a large coccus. Attempts to produce secondary cultures on neutral glycerine agar failed, but both germs grew well on alkaline agar.

These are not the only difficulties of the investigation.

The whole subject bristles with them. For instance, in investigating a series of normal urethræ, I have several times failed to obtain cultures by the method above described,—viz., that of passing a loop of platinum wire into the urethra, and subsequently succeeded by gently scraping the urethral mucous membrane with a fine curette, and making inoculations with that. Again, I have on several occasions obtained films on cover-glasses, in which germs were readily demonstrated by staining, by scraping urethræ which were normal, or by scooping out discharge from urethræ the seat of gonorrhœa or gleet, in cases in which careful inoculation yielded no result.

Nor does this end the list of difficulties. There is one of probably greater magnitude than any of the foregoing.

In the series of tests above detailed, the term "diplococcus" is largely employed, and I have been driven to the use of this collective term by two considerations.

In the first place,—and here I would speak at present with very definite reservations,—I am not certain that there is any way of distinguishing between the "gonococcus" and the other diplococci. There may or may not be. At present I do not know. Of one thing, however, I am convinced, and believe I have the means of demonstrating it,—viz., that much of what is published in the various text-books on this matter must be received with caution, if not ultimately entirely discarded as erroneous. In the second place, and to a large extent proving the preceding statement, I have repeatedly received contradictory reports from different competent bacteriologists on the same germ. In my possession are a large number of detailed reports on such cases. Repeatedly the same germ has been termed "gonococcus" by one authority, "micrococcus ureæ" by another, and some one or other of the various diplococci by a third.

And in reading the reasons detailed in these reports for the decisions come to, one ceases to wonder at the differences of opinion contained in them, and, as already stated, giving such contradictoriness to the various published statements.

The personal equation, for one thing, must be reckoned with. Particularly in the matter of Gram's test is this so.

What means decolorization to one eye is not so in the view of another of equal experience. Further, in making a series of examinations, as cases occur, germs which did not decolorize by Gram's method at the time of staining may gradually lose color on being kept till, in the course of weeks or months, the series is completed, the result being that the same germ may be at one time pronounced "micrococcus ureæ," and at another, "gonococcus" by different observers, or even by the same observer.

Again, there is the frequently quoted statement that the

relative size of the germs grown forms a distinctive point as between the gonococcus and the other diplococci of the urethra. My experience over a large series of cultures has been such as to raise, though not by any means to settle, the question whether it may not be the case that a given diplococcus varies in its size at different periods of its growth in the same culture, and whether it may not be distinctly modified in size in successive secondary cultures.

This question opens the entire field of mixed cultures (whether in artificial media or urethra), and of the effect of alterations in composition and reaction of media, and is manifestly one not capable of ready solution.

One other point remains. The appearances of a number of cultures (and I have before me now a series of growths highly suggestive in this connection) raise the further question of the relation of various morphological forms of germ found in the same culture. Take a tube in which, within a few days of inoculation, there are found patches of growth, which, on microscopic examination, are noted as "staphylococci of a size distinctly larger than those obtained from a recent case of facial boil. Staphylococci of very much smaller size. Diplococci of large size. Diplococci of smaller size and less defined outline." (This is the note of an actual culture obtained from a perfectly normal urethra.)

There are two possible explanations. (*a*) The tube contains a mixed growth; (*b*) the tube contains a culture of one germ only, which is in process of actively reproducing itself by fission. The solution of this question may or may not be possible in a given case.

In any event, it demands weeks of work in the production and observation of secondary cultures in media of various compositions and reactions.

During the past four years I have carried out carefully made and noted bacteriological tests in the following, among other, series of cases:

Cases of prostatic retention requiring instrumental aid.

Cases of tubercular disease of the prostate.

Cases of acute gonorrhœa.

Cases of chronic gleet.

Cases of adults with normal urethræ.

Cases of children with normal urethræ. (This investigation, carried out in cases under operation in the Children's Hospital during 1896, yielded some puzzling and suggestive results.)

The records (with, in many cases, the actual stained specimens, and, in a number, with microphotographs of the germs) of all the results are in my possession, and it had been my intention to publish them as part of this paper.

In the face of the difficulties and sources of fallacy above indicated, and of the secondary or subsidiary lines of investigation which have opened out in the attempt to eliminate these sources of fallacy, it seems preferable to delay publication in the mean time.

As already stated, Dr. A. R. Ferguson, assistant pathologist, Western Infirmary, and Dr. Leslie Buchanan, pathologist, Eye Infirmary, have kindly consented to aid me in further investigation, and have, indeed, already done much work in the matter, the records of which it is intended to embody in a joint paper. That the result of the investigation going on will be to finally settle all doubtful points in the subject no one practically acquainted with the nature of the difficulties will venture to predict. On the other hand, looking to the special fitness for such work of my collaborators, by reason of their special knowledge and great facilities, and having regard to the great amount of time and skill being devoted to the production of the records and specimens accumulating in Dr. Ferguson's hands, and of the microphotographs of these specimens accumulating in Dr. Leslie Buchanan's hands, it is possible that the publication of these records and microphotographs, with particulars of the cases to which they relate, may provide material to form a basis on which certain conclusions may be founded, and from which the investigation of possible difficulties may take origin.

URETERO-URETERAL ANASTOMOSIS FOR TRAUMATISM.

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EVERY operator of moderate or large experience in pelvic surgery has at times been greatly embarrassed in determining the position and relations of the ureters, and especially so when infiltrating malignant disease or dense and extensive adhesions were present, or when intraligamentary cysts or huge myomatous tumors covered with enlarged veins so distorted their position, size, and appearance that recognition was rendered exceedingly difficult, if not impossible. Passing, as they do, from the brim of the pelvis, in an arc of short diameter, to the base of the bladder, the ureters are not infrequently intimately involved in the diseased conditions. (Thus two cases are reported by Ruhl and Chrobak, in which the ureter passed directly through a portion of a uterine fibromyoma, and had to be freed from the growth for a distance of seven centimetres in one case and nine in another.)

This curve, beginning at the level of the origin of the obturator, vesical and uterine arteries, is about three and a half

inches long, and ends at the bladder (Holl). It is crossed at the level of the external os by the uterine artery, which is separated from it by a venous plexus. All the structures at this point are bound closely together by a sheath of dense connective and muscular tissue which forms the base of the broad ligament. Isolation of the included vessels is at best difficult. The relations of the ureters to the cervix, lateral fornices, and roof of the vagina are so intimate that many of the post-operative fistulæ have resulted from inclusion of the ureters in ligatures intended for the adjoining vascular structures or from injury during rough separation of bladder from vaginal wall. Out of over 100 cases of operative injuries to the ureter recorded in surgical literature, it has been impossible to find one in the male sex, most of them occurring, in course of hysterectomies, either abdominal or vaginal.

Tauffer is of the opinion that the ligatured ureter can be recognized, in a majority of the cases, by a careful final inspection just before closing the abdomen. The ureter will by this time have become considerably distended with urine secreted during the operation, and can be seen under the peritoneum. After closure of the abdomen the diagnosis is extremely difficult, except in those cases in which both ureters have been ligatured or severed. Then complete anuria will quickly call attention to the condition and the abdomen can be opened.

The following case which occurred in my service at St. Luke's Hospital is an excellent illustration of this fact:

The patient was a colored woman from Nassau, West Indies. She had never had any children and had no disease of any consequence, though now in her thirty-sixth year. About five years before her admission to the hospital she noticed for the first time that her abdomen had begun to swell. This steadily increased until the present time, but caused merely discomfort, and no very noticeable change in her general health. The examination of the abdomen showed a very large mass filling both the pelvis and the lower part of the abdomen. The cervix was completely obliterated, and the bladder and vaginal vault well drawn up. On

November 24, 1897, the patient was operated upon. The anæsthetic was ether and the Trendelenburg position was employed. While exposing the uterine vessels in the course of a panhysterectomy, what was supposed to be a large vein was noticed on the antero-internal surface of the tumor quite near the base of the right broad ligament, in company with a number of enlarged veins.

Although the possibility of its being the ureter was spoken of, its unusual position high out of the pelvis, its size, and the fact that it seemed to enter the tumor led to our cutting it, together with adjoining vessels between two ligatures. After the formation of the peritoneal flaps the uterus was removed by cutting off its vaginal attachment. The cut end of the vagina was closed with catgut sutures, and the two peritoneal flaps united in the same manner. Recovery from ether was uneventful. At the end of twenty-four hours no urine had been passed, and with the remembrance of the severed vessel an examination of the tumor was made, and on its right surface about an inch and a half of what was now recognized to be the ureter was found. The abdomen was immediately reopened and both ureters, dilated to the size of a little finger, were easily found. Tracing these down into the pelvis, what was our chagrin to find them both involved, the right sharply kinked by the closure of the peritoneal flaps but not included in a ligature. This was readily released by loosening the stitches and immediately discharged itself into the bladder. On the left side the two ends of the severed tube were identified, the proximal much dilated. After removal of its ligature urine was discharged and a No. 9 woven catheter introduced, its free extremity being held outside of the abdomen. The distal extremity, about an inch in length, was traced to the bladder. After careful isolation of the field with sterile pads two traction sutures were introduced close to the severed end of the kidney portion. The needles attached to these threads were then passed within the lumen of the vesical stump and made to emerge at two points about one-sixteenth of an inch apart on the respective sides.

The free end of the catheter occupying the renal stump was then passed into the bladder, caught by a forceps introduced into the meatus, and drawn down so that its mouth emerged into the vagina. The traction sutures were then slowly tightened, and in this manner the proximal extremity invaginated for about one-

half inch unto the lumen of the distal portion. After tying the traction sutures a circular continuous suture completed the anastomosis. As a further precaution against leakage, the loose connective tissue and peritoneum in the neighborhood were stitched about the line of suture. A small gauze drain leading from the site of operation was left in the lower angle of the abdominal wound, which was then closed with tier sutures, a second drain emerged into the vagina. The catheter was left *in situ* for five days, when removed it was perfectly smooth, only a few crystals being attached to the vesical end. There was quite a free serous discharge from the drainage-wick for several days, which seemed mixed with urine. It soon ceased and the abdominal sinus closed. A few days later pain deep in the pelvis with some slight febrile movement led us to reopen the abdominal sinus and pass a wick through it into the vagina by means of a long probe. Convalescence from this time was progressive but slow, the wick being gradually withdrawn through the vagina as the tissues behind it filled in. At the end of a month the abdominal portion of the sinus was entirely closed, and soon after the vaginal portion. During her convalescence a sharp attack of religious mania, lasting several days, gave us some uneasiness, but disappeared entirely, and for the past three weeks the patient has been in excellent condition. The urine at present is acid, of a specific gravity of 1010, with a trace of albumen and a small amount of pus, but no casts. The pus is accounted for by a moderate cystitis which the patient developed soon after the operation.

The chief points of interest in the case centre about the early diagnosis and the operative technique. The latter will be more fully dealt with later, and we will confine our attention to the clinical facts. In the first place, it is interesting to note that it is possible to ligature both ureters so completely that no urine is passed and yet have no violent subjective symptoms, though it is perfectly possible that a moderate amount of pain might have passed unnoticed in the general distress following the anæsthetic. But that this is not always the case is shown by several recent reports, in one of which the pain was violent and nauseating, approaching that of renal calculi, and another where there was a general distress

in the abdomen, soon becoming localized over the region of the affected kidney, and followed by a distinct tenderness and tumor in the lumbar area.

The complete recovery of the kidney function, after twenty-four hours of absolute obstruction to the urinary discharge, shows that there is time enough to remedy a resection or ligature of a ureter, if only we are on the lookout for the condition. Zweifel has indeed reported a case in which both ureters were tied for thirty-six hours, yet on opening the abdomen and releasing the ligatures there was a perfect recovery. No doubt the ureter is ligated far more frequently than is supposed, and yet does not gangrene, because of the abundance and peculiar arrangement of its blood-supply. Many cases are recorded in which it has been necessary to strip the ureter out of a bed of dense adhesions, or of carcinoma leaving several centimetres bare of peritoneal covering without producing any bad result. No doubt, also, many cases in which the ureter has been ligatured give no symptoms, for the reason that the urinary flow is sooner or later re-established by loosening or absorption of the ligature.

The chronological development of the operation for the union of the ends of the divided ureter is interesting enough to warrant a slight outline. To illustrate the various methods and to save long descriptions, a number of diagrams of the operations have been introduced. The early operations were devised to remedy distressing congenital defects, such as exstrophy of the bladder. The first recorded case we have been able to find is that of John Simon in 1851. He was at that time attached to St. Thomas's Hospital, in London, and the report shows that he made a careful preliminary study of the anatomy of the peritoneum and its relation to the pelvic viscera, especially to the bladder and rectum, with an idea to the formation of an artificial channel between the two. An attempt to anastomose the ureters into the rectum extraperitoneally, after the method suggested by Roux, resulted fatally in the animals experimented on, so a really much more crude method was finally attempted on the case of exstrophy. A

heavy silk thread was passed from a point one inch up from the mouth of the completely exposed ureter into the rectum and back again, keeping as close to the posterior surface of the pubic symphysis as possible. The same was done on the other ureter. The seton threads were then tightened from day to day as the tissues inclosed by them necrosed. In ten days some urine began to pass by rectum, and in three weeks nearly all, but the boy's condition, which had improved from the time of operation, now began to fail. Calculi were formed in the ureters near the artificial openings, but, nevertheless, the sinuses remained patent until death, which took place nearly a year later. Another London surgeon, encouraged by this result, made a similar attempt, but the case was rapidly fatal from peritonitis, the needle carrying the seton having entered the peritoneal cavity.

All this work was soon forgotten; Nussbaum, in 1876, makes no reference to it. His case was one of a woman, from whom he had removed a large ovarian cyst. A short time after she developed a urinary fistula in the abdominal wound, the whole urine from one kidney passing through a tract about the size of a lead-pencil. Nussbaum was aware of the careful studies by the German surgeon Simon, which led the latter to do the first deliberate nephrectomy for a urinary fistula, but for some reason was unwilling to undertake so grave an operation. Instead, he returned to the old method of Simon, of London, and opened a fistula between the bladder and a small urinary reservoir, which had formed just beneath the anterior abdominal wall. Into this tract he inserted a tube and waited for the abdominal opening to close. The patient, however, developed such an acute infection of the bladder that he was compelled to remove the tube. Finally the wound healed, all the urine flowing into the bladder, but, as the case is reported at the end of three weeks, the final result must be somewhat in doubt. Nothing more was done for three years, when, in 1879, Smith, of London, tried to palliate a case of exstrophy, but with a rather discouraging result, the patient dying in a few days of peritonitis from in-

fection by leakage. The method introduced little that was new, it was simply to resect the ureters from their attachment to the remnant of bladder wall and to suture them into small incisions in the rectum, as Simon had attempted in 1851. By this time, however, the ideas and methods of Lister had penetrated pretty thoroughly over the continent and experimental surgery on animals became a popular subject for investigation. Gluck and Zeller were among the first to enter the field. They experimented still with the idea of relieving congenital malformations, for abdominal surgery had not yet begun to furnish its own material, and their results, though successful in one way, were still not enough to encourage much operating. In a series of resections of the bladder with subsequent implantation of the ureters in the laparotomy scar, a large proportion of the cases was not followed by any unpleasant results in the animals used. On the other hand, all the cases in which an anastomosis was made between the ureters and colon or rectum, died from either sepsis or pyonephrosis. No further results are reported for some years, until 1886, when, curiously enough, two men, one in Italy the other in Germany, performed the operation for uniting the severed ends of a ureter, within a few days of each other and by quite different methods. Schopf operated on a case for the removal of a right ovarian cyst, and, while severing dense adhesions with the cautery, found that he had included the ureter. After simply freshening the ends, he did an end-to-end anastomosis. The patient did well until two weeks after the operation, when she developed an abscess in the abdominal scar. For some time there were symptoms of infection, and the autopsy, seven weeks after the operation, showed several abscess cavities in left upper lobe, an abscess containing ligatures on right side of uterus and a right hydronephrosis, caused by a stricture at the site of suture. The ureter at this place was also involved in the adhesions of a recent peritonitis. However discouraging this first result may have been, it at least showed that a tube as slender and delicate as the ureter could be sutured, and the results of Poggi, the other operator,

obtained on animals this same year, proved that it could not only be sutured, but that a stricture in the lumen of the tube did not necessarily follow. His results were most brilliant. In three anastomoses done on dogs, in which the ureter is much smaller than in man, all the animals recovered, and the ureters were removed at the end of fifteen and sixteen days and three months and a half. In the early cases the invaginated ends still projected somewhat into the lumen of the tube, but were entirely covered by a new growth of epithelium, and there was absolutely no stricture at the point of juncture. In the older specimen, on the other hand, the lumen was perfectly smooth, and there was, if anything, a slight dilatation, the reproduction being in every respect perfect. These results have, we believe, never been reproduced with any success approaching that of their discoverer. A few attempts were made three years ago with this method on animals by Budinger, but with fatal results in every case, death being due to infection from leakage at point of suture. In the five years following the work of Poggi, numerous experiments were made on animals to devise a means to remedy the rapidly increasing number of urinary fistulæ, which followed the development of pelvic surgery, and to extend surgical aid to conditions which had previously been inoperable. The Italian operators easily took the lead in the ingenuity of their methods. Such remarkable results were obtained as the entire removal of the bladder and the suturing in its place of an isolated loop of small intestine, the ureters being then anastomosed into this new receptacle for urine (Tizzoni and Poggi). After these animals had lived a sufficiently long time, this piece of gut could imitate its predecessor in a very remarkable way; the villi of the mucous membrane were replaced by flat epithelium, the muscular coats would contract on stimulation of the ureters as does the normal bladder. The dogs urinated at fairly normal intervals, so that, so far as could be judged, it left little to be desired. Far different were the results of the anastomosis between ureter and the rectum, fully 90 per cent. of the results proving fatal. Of recent years,

however, this heavy mortality has been changed, both in man and animals, by a much improved knowledge of the dangers of the operation and the methods of avoiding them. Up to the present date the operation for anastomosis of the ureter into the rectum has been performed about thirty times, with a mortality of 30 per cent., while in the last ten cases the mortality is far less than in the first twenty.

The status of the operation for implantation of the ureters into the bladder is far better, there being no risk of ascending infection reaching the kidney as in the case where the ureter enters the rectum. The results on man are quite numerous, with a considerably less mortality than in the rectal operation. The operative technique has been modified from time to time, but has practically been sifted down to a procedure closely resembling in many features that devised by Witzel for gastrostomy.

In 1892 Van Hook published his ingenious method of lateral implantation, devised with an idea to prevent any narrowing of the lumen of the ureter by contraction of the cicatrix, such as has been observed after intestinal operations. To accomplish this, one end of the ureter is inserted into a slit made in the side of the other segment. By this means Van Hook claims that all constriction by contraction of a circular wound is avoided, and his assertion has been borne out by many operations on animals and three on women; one by Kelly, of Johns Hopkins, on a case in which the ureter was injured during the course of an operation for myoma; another by Bache Emmet, and a third by Doherty, of Georgia.

In 1897, Bovée (*ANNALS OF SURGERY*, p. 51), in reporting a case of his own, has been able to collect twelve cases of ureteral anastomosis, of which two, those of Fritsch and Pawlik, must be discarded, because the ureter was not completely severed in either. The description there given of all these cases is so full and recent that we will not give more detail than is furnished by the diagrams and the report of the results. Bovée's own method was quite original, and attempts to avoid any cicatricial contraction by a means some-

what different from that hitherto employed. He cuts off the ends of the two severed portions very obliquely, and then unites them by an interrupted suture. Thus the line of the



FIG. 1.—Method of Schopf, Hochenegg, and Cushing.

cicatrix is not transverse, and a contraction stenosis is avoided. Winslow (*ANNALS OF SURGERY*, Vol. xxvii, p. 46) reports a single case of anastomosis, which was successful,

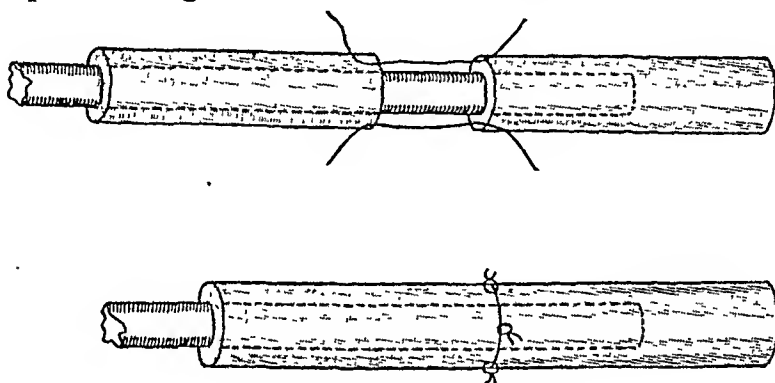


FIG. 2.—Method of Tauffer.

but adds no new points of value. A tabular view of the four methods employed is as follows:

(I) Transverse end to end.



FIG. 3.—Method of Bovée.

(a) Without support,—Schopf, Hochenegg, Cushing.
(Fig. 1.)

(b) With support,—Tauffer. (Fig. 2.)

(II) Oblique end to end,—Bovée. (Fig. 3.)

(III) Invagination.

(a) Without support.

(i) Ureter not split,—Poggi. (Fig. 4.)

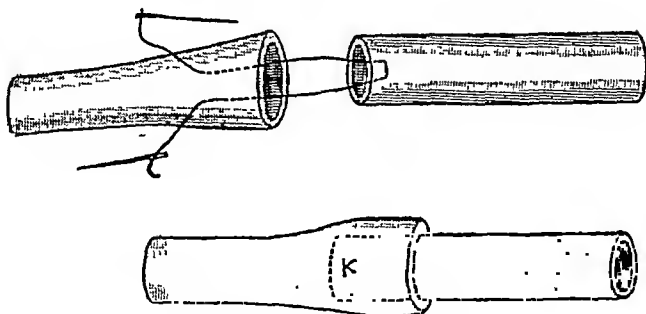


FIG. 4.—Method of Poggi.

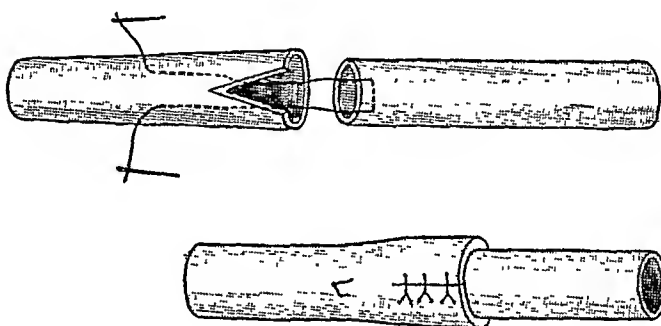


FIG. 5.—Method of Mayo Robson and Winslow.

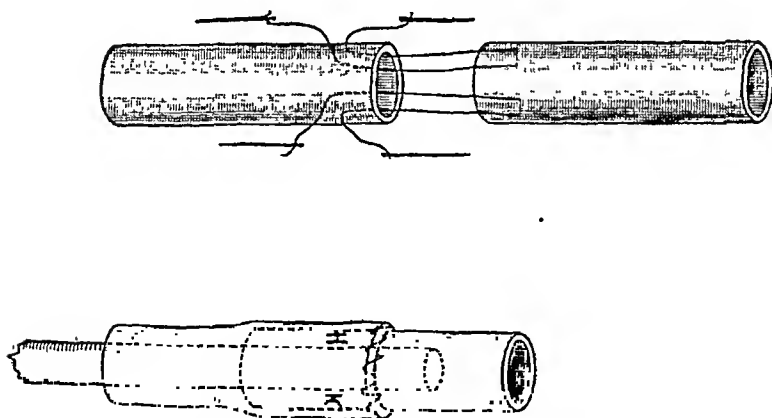


FIG. 6.—Method employed by the authors.

(2) Ureter split to invaginate,—Mayo Robson, Winslow. (Fig. 5.)

(b) With support,—Markoe. (Fig. 6.)

(IV) Lateral implantation,—Kelly, Bache Emmet, Doherty. (Fig. 7.)

Many ingenious plans have been suggested to overcome the difficulty arising from too great loss of ureteral substance to permit approximation of the cut extremities. None has been tried on the human subject except those mentioned before,—implantation into intestine, bladder, or skin. Bovée has suggested the loosening and downward displacement of the kidney, which is to be sutured in its new position when the anastomosis is completed; Monari, the attachment of the

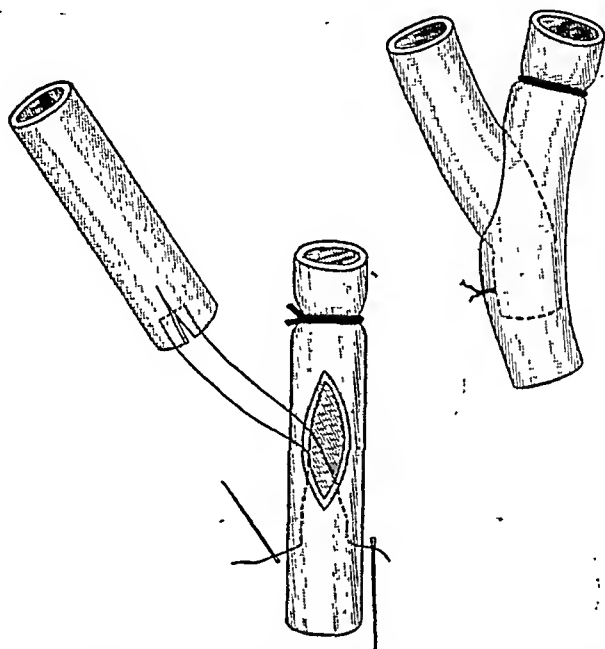


FIG. 7.—Method devised by Van Hook, and employed by Kelly, Bache, Emmet, and Doherty.

short severed ureter to the abdominal wall under considerable tension and when sufficiently elongated, an attempt at union by the method familiar in intestinal work,—lateral anastomosis. Rydygier suggests the formation of a channel lined with skin to connect the severed ends of the tube after implantation of the latter on the abdominal wall, while, finally, Van Hook advises the elevation of a bladder flap to form a diverticulum to meet the shortened end of the ureter, and thus conduct the urine to the bladder. All these, however, are

mere suggestions, which have never been properly tested in the human subject, and therefore do not concern us further.

In all cases of severed ureters the operation of election seems to be uretero-ureterostomy, if it may be so called, and preferably according to the method devised by Van Hook, if too great a length has not been removed, for it must be remembered that there is some loss of valuable material in anastomosis by this method. In case a loss of several inches has occurred, an end-to-end or oblique suture will be the preferable procedure. The results of the anastomotic method have been exceedingly encouraging; of twelve cases there have been only two deaths, and these not due to the special portion of the operation, but rather hæmorrhage, shock, or infection. It must also be remembered that the application of these methods has often been necessary under the most trying conditions, when, after a long and difficult operation, the wound in the ureter is discovered and must be repaired. This would naturally tend to increase the number of fatal cases, and that it has not done so is an indication that such an attempt to unite the ends should be made in all cases rather than to remove the corresponding kidney or to ligature the ureter and wait for hydronephrosis and subsequent atrophy to take place.

Uretero-cystostomy is chiefly applicable to those cases in which the ureter has been severed at a point below the ileo-pectineal line, the vesical end being so short and so deeply situated that it is nearly impossible to suture it. The upper end in this case is quite easily inserted into the wall of the bladder.

Uretero-enterostomy is to be employed only in cases of exstrophy, or where it is necessary to remove the bladder for extensive vesical new growths.

MOVABLE KIDNEY.¹

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IN the present paper movable kidney will be discussed entirely from a practical stand-point. It is a well-known fact that movable kidney is more common in women than in men; that the right kidney is the organ more commonly at fault, and that both kidneys may be movable. It is asserted that most women who are affected with this condition have borne children, or had an abdominal tumor removed; but this is not in accord with my personal experience. In fact, the greater number of cases coming under the writer's observation have been in unmarried women of a markedly nervous temperament. The question of the cause or causes of movable kidney is debatable, and one which is not by any means definitely settled. The determination of the cause is not a practical point; but the practical considerations are the detection and correction of the abnormality, the method of treatment for alleviation of the symptoms, and the operation which is safest and least likely to be followed by a return of the deformity. I will therefore speak of the symptoms of movable kidney,—the differential diagnosis between this condition and those affections which may be mistaken for it, and the operative treatment which has given the best results in the writer's experience.

Movable kidney may be indicated by the presence of an abnormal depression in the flank; but this I regard as of little moment in the diagnosis of a movable kidney, a

¹ Read before the Philadelphia Academy of Surgery, March 6, 1899.

movable tumor characteristic in shape, which, by properly directed pressure, can be restored to its normal position. The best position of the patient in which to detect and replace a movable kidney is lying upon the side opposite to that of the organ supposed to be affected. The legs should be flexed upon the thighs, the thighs strongly flexed upon the abdomen, and the spinal column flexed so as to bend the trunk as far forward as possible. The patient is now requested to take one or two deep inspirations, so that, if the kidney is movable, displacement of the organ will be assured. In this position the kidney is readily detected and returned to its normal position.

Auscultation over or in the immediate neighborhood of the displaced organ may elicit a bruit, the result of twists of the renal vessels. The bruit as well as perceptible pulsation of the abdominal aorta, due to traction on it by the renal artery of the affected kidney, disappears when the kidney is pushed back into its natural position. Throbbing of the aorta is frequently felt and seen in these cases, and should not be mistaken for aneurism. Slight catarrhal jaundice is present in a small percentage of cases, the result, I believe, of the general catarrhal condition of the lower alimentary tract, from which so many of these patients suffer, and not to parietal obstruction of the common or the hepatic duct by traction of the displaced organ.

In discussing the symptoms it must not be forgotten that, in a large percentage of cases, the condition gives rise to no trouble. The more common symptoms are a sense of dragging and discomfort, pain in the lumbar region of the affected side or pain referred to other regions, as the chest-wall in the line of the intercostal spaces. In the majority of cases the symptoms are those of neurasthenia with dyspeptic derangement, flatulence, and more particularly attacks of mucous diarrhoea. In movable kidney, but more especially when the organ has a more or less wide range of motion, the patient may be suddenly attacked with excruciating abdominal pain, paroxysmal in character, attended by nausea, vomit-

ing, chills, a subnormal temperature, or it may be that the temperature is elevated to the degree of fever. Associated with these acute symptoms are marked rigidity and tenderness of the part of the abdominal wall overlying the displaced organ and for some distance beyond; and pressure upon the organ causes a sickening pain,—“fainting pain.” Coincident with the above condition is frequent desire to urinate and pain referred in the line of the ureter. I have in occasional instances seen hæmaturia. In some cases the patient describes the sensation of a moving body within the abdomen, and others claim to be able to feel and locate it. The variability of the pain, referred here, there, and yonder, is understood when we recall the rich net-work of sympathetic ganglia and nerves in relation with the kidneys and suprarenal capsules. The pain in movable kidney is aggravated by assuming the erect posture. The pain may resemble that in nephritic colic. Paroxysmal attacks of pain are most likely to be excited by unusual exertion of any kind, such as dancing, etc. In females they not uncommonly occur during menstruation. The attacks of pain are frequently preceded by diminution in the quantity of urine passed.

The conditions between which and movable kidney we have especially to distinguish are a displaced spleen, an enlargement of the gall-bladder, a growth of the pylorus, of the head of the pancreas, or, of the ascending or descending colon, mesenteric or omental growths, an elongated lobule, circumscribed abscess or echinococcus cyst of the liver, an ovarian tumor with a long pedicle, a pedunculated uterine fibroid, appendicitis, and nephritic colic. The differential diagnosis between a movable kidney and the above conditions is, in the absence of acute symptoms, usually not difficult. Movable kidney attended by acute exacerbations of pain, vomiting, and circumscribed rigidity of the overlying belly wall, may be very difficult to distinguish from acute appendicitis, or an elongated lobule of the liver, the site of a circumscribed abscess.

The points of difference between a displaced spleen and

a movable kidney are that in the former the shape of the organ, the recognition of the hilum, the greater range of motion, the difference in the location of the organ, the absence of splenic dulness over the normal site of the spleen, the absence of urinary symptoms, which are present to a more or less degree in a greater number of cases of movable kidney, and the ability to return the organ to its natural position, where it can be located by percussion.

Between an enlarged gall-bladder and a movable kidney the points of difference are—the position which the gall-bladder occupies, the fact that in enlarged gall-bladder the lower part of the tumor is more freely movable than the upper; that the lower end of the gall-bladder enlargement is more rounded and less resistant on pressure, the absence of jaundice, and of a cholelithiatic history. In some cases of gall-bladder enlargement a sense of fluctuation is elicited. However that the lower end of the tumor formed by enlargement of the gall-bladder can at times be carried into the loin-space, to the extent of making the latter prominent, and thus simulate a replaced movable kidney, I have demonstrated upon more than one occasion. When the patient is in the supine position and the lower end of an enlarged gall-bladder is sufficiently movable to permit of its displacement into the loin-space, that organ returns to its normal position after removal of the pressure, while this is not the case with a repositioned movable kidney, if the patient observe strict quiet and does not breathe deeply. The conditions under which this is impossible are when the gall-bladder is tied and matted to the adjoining viscera by exudate or strong adhesions.

Between a growth of the pylorus and a movable kidney there is some resemblance, in that the growth of the pylorus may be very movable and that in size it may resemble a kidney. Differentiation of the two, however, should not be difficult. The pyloric growth differs in shape, is ordinarily of stony hardness, and has an irregular surface, and in the majority of instances is felt in the immediate neighborhood of the umbilicus, and is flat upon percussion. Further, the

age of the patient, about middle life, loss of flesh, cachexia, in some instances gastric symptoms, which may arouse suspicion, and which, upon careful examination of stomach contents, etc., may shed light upon the diagnosis.

Between a growth of the head of the pancreas and movable kidney there should be little difficulty in arriving at a correct conclusion. A growth involving the head of the pancreas, which in the majority of instances is malignant and, like retroperitoneal growths, is immovable, irregular in outline, and presents to the educated examining finger a sense which is not communicated by a movable kidney. Further, the time of life at which these growths are most likely to occur, the condition of the patient, and their frequently associated symptoms of gastric or hepatic disturbances, so often accompanying malignant disease of this gland, should not be overlooked. Again, if the growth trespass upon the common bile-duct, where it occupies the pancreatico-duodenal sulcus, jaundice will be a symptom.

Between movable kidney and a growth of the ascending, transverse, or descending colon, a growth of the mesentery or of the omentum, or a faecal mass in the colon, there should, ordinarily, not be much difficulty in arriving at a correct conclusion. These growths are dull upon percussion, and seldom can they be displaced into the lumbar region. They are more commonly located near the middle line of the abdomen, are malignant in nature, do not present the sensation to the finger which is so characteristic of a movable kidney when it slips away from the palpating hand, are irregular in outline, and communicate to the examining finger a peculiar hardness characteristic of a carcinoma. Further, evidence of dyscrasia and of bowel-disturbance, such as diarrhoea with tenesmus, or constipation, the presence of mucus or blood in the stools, loss of flesh and perhaps a cachexia, family history, etc. The time of life at which these growths are most commonly seen may influence the diagnosis. A sarcoma of the wall of the large bowel is more likely to cause an error in diagnosis, particularly, if it is present, as a pedunculated growth. If a faecal

mass is suspected, the administration of purgatives, high injections, etc., will clear up any doubt.

Between a movable kidney and an elongated lobule of the liver, a circumscribed abscess occupying an elongated lobule of the liver, or an echinococcus cyst of the liver, the diagnosis should be made by observing that, in the presence of an elongated lobule of the liver the dulness upon percussion is continuous with that of the liver; that the lower end of the tumor is more rounded; that it is smooth in outline, and that in forcing it into the loin-space much more pressure is required than in restoring a movable kidney.

Between movable kidney and a circumscribed abscess occupying the site of an elongated lobule of the liver there should be but little, if any, difficulty in differentiating, when it is borne in mind that a movable kidney, except during an exacerbation of acute pain attended by vomiting, rigidity of the overlying abdominal wall, etc., presents no symptoms of an inflammatory affection. The absence of deep fluctuation, of the characteristic hectic temperature of liver abscess, of increased pulse-rate, of chills, of pain referred to right shoulder, and of constant tenderness over the affected area, whereas immobility of the growth and leucocytosis, detected by examination of the blood, indicate abscess.

A movable kidney may be distinguished from an echinococcus cyst of the liver occupying the epigastric or right hypochondriac region by observing the following points: An echinococcus cyst of the liver is an immovable, painless enlargement, either regular or irregular in outline, and presents a smooth surface, fluctuation, and possibly the hydatid tremor. It has existed for some time, grew downward from the liver, and has caused no disturbance of the health.

Between a movable kidney and a small cystic or a solid ovarian tumor and a pedunculated uterine fibroid the diagnosis is ordinarily not difficult. The points to be considered in the differentiation are the size and form of the movable tumor, the direction in which it is most readily displaced, if a kidney into the loin-space, if ovarian or uterine in the direc-

tion of its attachment to the latter, the tendency to increase in size, the absence of urinary symptoms which attend many cases of movable kidney, and the presence of fluctuation, if it be a cystoma of the ovary. The diagnosis may, however, be attended with difficulty.

The symptoms occasioned by the ovarian or uterine condition are usually not present until the growth is of considerable size, which would mark it from movable kidney.

Movable kidney is differentiated from appendicitis by observing the following points: In arriving at a correct diagnosis between movable kidney and appendicitis, first in importance is the fact that movable kidney is most commonly seen in neurasthenic women who have gastro-intestinal disturbance. The attacks of pain in movable kidney are associated with nausea and vomiting, fever, and often chills. In the majority of instances the urinary function is disturbed, as instanced by the frequent desire to urinate, the act of which may be painful and the urine large in amount, particularly if the patient is of a nervous disposition. The urine may contain blood, and, as I have seen in some attacks, pus, but the high color of the urine is more likely to be due to the presence of an excess of uric acid or oxalates. The differentiation between the local disturbance during an attack of pain in a movable kidney which is dragging upon its pedicle, and appendicitis is, to say the least, highly important. From the history can be learned the frequency of the attacks of pain, its nature, the part of the abdomen to which the pain is referred; whether it is confined to one point or shifts; whether or not it occurred after the ingestion of a heavy meal, exposure to cold, or during the period of digestion, or after unusual movement or position or indirect violence. The degree of illness following must be ascertained as well as the tendency of the patient to constipation or diarrhoea. During or following an acute exacerbation of pain due to movable kidney, occurring in either a nervous or robust individual, local examination will show pronounced rigidity of the overlying

abdominal wall, with tenderness, the degree of which is in direct proportion to the muscular rigidity.

The important differential points between appendicitis and movable kidney are these: In appendicitis we have the sudden onset of acute abdominal pain, most commonly following the partaking of indigestible foods, and which, at first, is referred to the epigastrium or to the region of the umbilicus, and later becomes localized in the right iliac fossa. The presence of fever and an increased pulse-rate are more indicative of appendicitis. Also in appendicitis, the rigidity of the lower portion of the right rectus muscle, and the flat muscles of the abdominal wall immediately overlying the inflamed organ, differs from the rigidity present in movable kidney in that it does not involve so much area. The presence of a most acute tender point, which corresponds to the position of the inflamed appendix, is, at least early in the inflammation, more circumscribed than the tenderness in movable kidney. The tender area over a movable kidney is not so painful to slight pressure and extends over a greater area. The pain which, as a rule, is not so intense is at once referred to the site of the kidney or is reflected along the course of the ureter. Movable kidney, attended by both pain and rigidity, requires very delicate manipulation to detect it. By having the patient breathe with the mouth open, and with the thighs slightly flexed upon the abdomen, gentle pressure enables us to detect the kidney slipping away from the examining finger. There are cases, however, where nothing short of anæsthesia will clear up the question of a movable kidney. The presence of nausea, extending over days, is one of the most prominent symptoms in certain cases of movable kidney.

The operator may be thrown off his guard by acute indigestion occurring in a nervous individual suffering at the same time from acute paroxysms of pain due to a movable kidney, which was previously not known to the patient or to the physician. Under these circumstances the kidney may become temporarily anchored in its abnormal position. Under

the foregoing conditions I have been called to operate for acute appendicitis, but could not say definitely that the case was not acute appendicitis until the patient was fully anæsthetized; then upon palpation the diagnosis at once became clear. Again, in the presence of both conditions—*i.e.*, movable kidney with acute symptoms and an enlarged appendix due to chronic inflammation—examination under ether will disclose not only the abnormal condition of the kidney, but also the presence of a palpably enlarged appendix. If under these circumstances the patient has been suitably prepared, an appendical operation should be performed. The operator, whose experience in appendical work has been rich, can usually say, upon what to the by-stander seems to be a superficial examination of the belly wall, whether the case is one of movable kidney or appendicitis. On the same principle, in the presence of a peritonitis, the result of appendicitis, the every-day operator can often separate the operative from the non-operative cases merely by palpation of the belly wall.

That movable kidney is mistaken for nephritic colic is evidenced by reports of cases. The subsequent symptoms of the two conditions bear some resemblance to one another, I admit; yet, after careful examination, that they should be confounded, I confess, I cannot quite understand. The presence of a calculus in a movable kidney is a different matter entirely. A properly taken X-ray picture would settle this question. The point which clinches the diagnosis in the case of movable kidney is its detection; that this is possible there is no doubt. In very stout persons difficulty in detecting the movable organ is increased, but in my experience is made certain by the administration of an anæsthetic.

The author has not included the various types of movable kidney in this paper, as he believes it simplifies the subject to describe them *in toto*, as he has done.

The treatment of movable kidney resolves itself into palliative and curative.

Palliative treatment consists of attention to the general health, attention to digestion, the administration of tonics,

hydrotherapeutic baths, general massage, and the adjustment of some form of support which will retain the organ in its normal position. As to the question of the proper form of support or of retaining appliance, I confess that I have yet to see one which is satisfactory; in fact, it is my experience that these appliances are more harmful than useful, therefore, if the patient is a great sufferer, particularly from frequent attacks of paroxysmal pain attended by vomiting, rigidity of the overlying abdominal wall, etc., which I am constantly seeing confounded with appendicitis, I believe that operative treatment of a radical character is indicated, certainly in at least the majority of these cases. Many different operative procedures are advised for the correction of this deformity, among the most important of which are stitching the kidney fast by carrying sutures through its capsule and substance, by dividing its capsule and stitching capsule fast, and by transplanting the kidney, as it were, an operation which has been recently advocated. As I have operated upon several cases of movable kidney and have seen the disastrous results of some of the forms of operation, I unhesitatingly put myself on record in favor of anchoring the kidney by gauze packing, as I will describe, and against suturing, particularly when the kidney substance is trespassed upon. Unfortunately, I have seen treated one case of movable kidney by suture, and in this case subsequent abscess-formation resulted consequent upon urinary infiltration into the substance of the organ through puncture of the uriniferous tubules with the needle. In this case it was finally necessary to perform nephrectomy. I would, therefore, raise my voice against any operative procedure which punctures the substance of the organ, and with more substantial reason, since I can bear witness to good results obtained by the gauze-packing method. The operation which the writer invariably performs was suggested to him two years ago by Dr. Nicholas Senn, but does not in detail correspond with the Senn operation.

The kidney is repositied in the loin-space and held *in situ* by an assistant.

A vertical incision, three to four inches in length, is carried through the loin-space of the affected side and the perirenal fat exposed. This consists of two layers, the adipose layer proper and the fibrous layer, which closely resemble the parietal peritoneum. The outer layer of the fat is carefully dissected off. To accomplish this I frequently entirely deliver the organ. All of the posterior part of the fatty capsule is cut away and that of the anterior part as far as the hilus. The capsule proper of the kidney is next carefully scarified with the scalpel, not trespassing upon the kidney substance. Two long pieces of gauze are now selected, one is passed beneath each pole of the kidney, and the organ is repositied. With the organ *in situ* and the pieces of gauze carried beneath the poles protruding from the wound, more gauze is gently packed around and over the kidney, between it and the pieces of gauze first introduced. Over the gauze packing the first or long strips of gauze are tied, and a large gauze pad is placed upon the anterior abdominal wall over the site of the kidney. The wound is dressed and the dressing and anterior gauze pad are securely held in place by a strip of adhesive plaster carried around the abdomen. Over the pad of gauze and the gauze covering the wound an additional dressing is applied, and retained by a few circular turns of a bandage. This operation is not difficult, and requires but ten to fifteen minutes. The patient is made to assume the supine position. At the end of a week or ten days the gauze is removed, and the bed of the kidney and the surface of the organ will be found to be studded with healthy granulation. The wound is washed out with sterile water or a weak solution of bichloride, to which is added carbolic acid. The wound is gently repacked and dressed after the usual manner. The wound heals completely in from four to five weeks. I commend this operation as I have had a number of cases, a large percentage of which I have seen frequently since the day of operation, and the result in all is most satisfactory.

I have had the opportunity of a still better test than that of inspection and questioning the patient,—namely, that of

palpating the organ from within the abdominal cavity when performing a subsequent operation for an entirely different condition. Here I found the kidney occupying its bed, which proved to me that the ultimate results from this procedure would be good.

Relative to the question of suture of the kidney or its divided capsule, I do not for one instant think that the sutures play any part in the retention of the organ, other than through resulting inflammation and the inflammatory deposit consequent upon their introduction. In other words, I believe that the manner in which the kidney is permanently fixed in its bed in the few instances of relief which follow these procedures, is the same as that following the operation recommended,—namely, inflammation, granulation, etc. I believe, further, that the manipulation to which the organ is exposed in carrying out the suture process is more responsible for the ultimate anchoring than is the introduction of sutures. Again, the operation recommended in this paper does not expose the organ to the injurious effects of urinary extravasations, which occurred in the experience of the author, and also in that of Mr. Christopher Heath, who, Dr. Keen tells me, has discarded the operation of suturing the kidney for these reasons.

That the presence of sutures in themselves play no part in retaining the kidney can be demonstrated by carrying two or more of these through the kidney and holding the organ up by either end of the suture, when it will be seen that the weight of the organ is sufficient to cut the sutures out. Again, those of us who see a large number of these cases know too well that a recurrence of the deformity after the suturing operation is not uncommon. One of the first cases that the writer has seen was in the care of the late D. Hayes Agnew. Six months after the operation of nephrorrhaphy I saw this distinguished surgeon remove the organ for displacement, because of return of the symptoms for which the first operation was performed.

The report of cases of movable kidney herewith appended

include only those which have been treated after the method advocated by the writer in the paper under discussion.

CASE I.—Miss N., aged twenty-four years; neurasthenic. Has had attacks of kidney colic. Right kidney affected. Operation, March 3, 1898. Packing removed and redressed. On sixth day, subsequent dressing at intervals for three days, until wound closed. Discharged cured.

CASE II.—Mrs. C. K., aged fifty-seven years. Admitted to the German Hospital February 10, 1898. Had complained of pain in left side and loin for two years, when lying down, standing, and walking. The pain came on suddenly after lifting a heavy burden. For some weeks noticed a movable mass in left iliac fossa, moving with diaphragm, also on standing up. On examination the mass can be felt falling downward and forward on assuming the upright position. Tender to touch. During the last two years has had trouble with her bladder; frequent urination, alternating with attacks of retention. Operation February 12, 1898. Packing removed on the sixth day. Redressed every third day. Discharged cured.

CASE III.—J. M., aged twenty-six years. Admitted to the German Hospital February 7, 1898. For three months had complained of considerable pain in epigastrium, shifting to right loin and liver area. Had been quite nervous during this period. Examination revealed a mass moving downward with inspiration, and which could be repositied in loin-space. Operation February 9, 1898. Outside dressings changed on third day. Under ether the gauze packing was removed on seventh day. Redressed every third or fourth day. Discharged cured.

CASE IV.—M. B., aged thirty years. Admitted to the German Hospital June 1, 1897. Examination: Kidney palpated; tender and distinctly movable. Disappears entirely when patient assumes position on left side. Operation June 6, 1897. Gauze removed on seventh day. Kidney in good position in bottom of wound, apparently well anchored.

CASE V.—L. A., aged twenty-four years. Admitted to the German Hospital July 1, 1897. At the age of fourteen she first felt a pain in right side below costal border. Has had it on and off ever since then, accompanied by backache and pains in thighs. Had little nausea or vomiting. Three months ago a movable

kidney was discovered. Patient had lost flesh and strength. Operation July 6, 1897. Gauze removed on sixth day. Redressed. Kidney in good position. On thirteenth day kidney well anchored. On thirty-second day discharged. Kidney in good position, firm.

CASE VI.—A. L., aged thirty-four years. Admitted to the German Hospital February 11, 1898. When a child was injured in the right side, and ever since then has had dragging pain in right loin-space and right iliac fossa, increasing as the years passed. During the last four or five years it has been quite severe, giving rise to digestive disturbances, nausea, vomiting, constipation, and loss of appetite. Has become emaciated. A movable tumor can be felt in right iliac fossa and repositied in right loin-space. Tender to touch. Palpation produces nausea. February 24: Operation. February 26: Dressed. *Outside dressings only removed.* March 24: Patient has been redressed every three or four days. March 26: Patient allowed to get out of bed. April 4: Wound completely healed. Recovery.

CASE VII.—W. W., aged twenty years. Admitted to the German Hospital October 30, 1897. Has been sickly all her life. Had a severe fall five years ago. Two years later noticed a movable mass in right side of abdomen, tender to touch. Has had nausea and vomiting since the mass made its appearance. Stomach was very irritable; could retain little food. November 2: Operation. November 7: Gauze removed. Another piece packed under kidney and around it. Granulating well. November 14: Dressed again, the same done as at first dressing. Wound filling in. Kidney apparently well anchored. December 9: Discharged after repeated dressings. Wound now almost closed. Kidney firm in place.

CASE VIII.—C. H., aged twenty-four years. Admitted to the German Hospital December 3, 1898. Present condition: One of four months' duration, when she had a dull pain on the right side below the ribs, this gradually increased in severity. She felt a swelling in the same position, which was movable. About two months ago had another attack, which lasted about a week. She says she remembers having several attacks of pain before she discovered the swelling, but always attributed them to dyspepsia. When she turns from one side to another she feels the kidney moving, which gives a dull pain. She has never had any sharp

pain and has never vomited with an attack. There has been no vesical disturbance. The kidney is distinctly felt on the right side and is freely movable. It is tender to touch. Operation: Kidney anchored in position. Discharged cured.

CASE IX.—E. P. C., aged thirty years. Admitted to the German Hospital October 31, 1898. A week ago the patient's attention was drawn to the abdomen, when he noticed a movable mass in right loin-space and iliac fossa. Tumor was freely movable, and could be pushed back into the loin-space and retained there. The mass was quite tender to touch. Numbness was felt by the patient in right kidney-space when on his feet a long time, also a sensation of weight and dragging in right side of abdomen on standing up. November 1, 1897: Operation. November 5: Gauze removed. Repacked. Dressed every week. December 1: Wound granulating nicely. December 14: Wound about half inch deep, two inches long. Nitrate of silver, 10-per-cent. solution, applied. December 18: Patient feeling very well.

PRELIMINARY REPORT ON THE SURGICAL
ANATOMY OF THE GALL-BLADDER AND
DUCTS FROM AN ANALYSIS OF ONE
HUNDRED DISSECTIONS.¹

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THE facts in gross human anatomy have been so well established by the work of so many able observers that one cannot hope, at this late day, to present anything new.

As surgery advances, however, and new regions are invaded, and new and improved operative procedures are suggested, a review of our anatomical knowledge is often of benefit, as it not infrequently assists us in the choice of incisions, methods of reaching certain organs and structures, as well as giving added and new significance to neighboring landmarks.

Owing to the wide-spread interest recently awakened in the surgery of the biliary passages, and the possibility of relief afforded by the many new and ingenious operative procedures which have been suggested and successfully carried out, the writer in October, 1897, through the kind permission of Dr. George S. Huntington, professor of anatomy at the College of Physicians and Surgeons, undertook a series of regional dissections in the Anatomical Laboratory of Columbia University.

These dissections were undertaken, first, with a view to familiarizing himself with the normal relations of the parts,

¹ Read before the New York Surgical Society, January 25, 1899.

of noting the comparative frequency of the most commonly observed variations from the normal, of educating his tactile sense for recognition of structures which, during operation, are often concealed from view or rendered visible only with difficulty, as well as perfecting his technique in handling, dividing, and suturing these delicate tissues.

And while it is not the writer's intention to enter into an exhaustive discussion of the entire subject at this time, he may be permitted to call attention to a few facts observed, which may be of some value to those interested in the surgery of this region.

To insure accurate observation, the following plan was adopted. With each subject sent to the dissecting-room was a printed card requesting the student assigned to the abdomen to leave the gall-bladder, ducts, and duodenum undisturbed until the examination had been made and measurements taken. As soon as possible after the abdomen was opened the writer made a careful examination of the parts, noting the relations of the various organs and structures, palpating the gall-bladder and ducts; later the gall-bladder was incised and explored, the ducts exposed, the duodenum opened, the position of the duodenal orifice of the common duct determined, measurements taken, and the ducts probed.

During the fifteen months which have elapsed since undertaking these investigations the writer has been able to examine with more or less care 100 subjects, and an analysis of the results obtained will form the basis of this paper.

Gall-Bladder.—The gall-bladder is usually described as a pear-shaped, musculo-membranous pouch, situated on the under surface of the liver, occupying a position in the fissure between the right and quadrate lobes, the fundus lying anteriorly and projecting for a short distance beyond the free margin of the liver immediately behind the cartilage of the ninth rib, its neck assuming a double curve similar to a letter S, gradually becoming narrower until it merges into the cystic duct. The point of junction with the duct lying near the right extremity of the transverse fissure of the liver, between the two folds of the gastro-hepatic omentum.

Of the 100 subjects examined, in no case was there any considerable variation from the normal position of the gall-bladder, excepting that which could be accounted for by its method of peritoneal attachment, or a change in the size of the liver. In the great majority of instances the gall-bladder received but a partial peritoneal investment, from one-fourth to one-third of its surface being directly in contact with liver tissue. In five subjects, however, it was attached to the liver only by means of a double fold of peritoneum, forming a distinct mesentery, allowing considerable movement. In three of these there was also an extension outward of the free border of the lesser omentum to the fundus, and in one instance to a point one inch beyond the fundus, thus forming a double mesentery, the upper being attached to the under surface of the liver, the lower to the duodenum and transverse colon, and in the one instance, just referred to, to the hepatic flexure of the colon.

These variations in the peritoneal arrangement allowed a considerable amount of mobility of the viscus, which, if rendered palpable by the presence of calculi or malignant disease, might be felt at any point within the radius of its mesentery.

In only one instance of the five did the abnormal peritoneal arrangement present any feature of surgical importance, and that was the case in which the hepatic flexure of the colon presented a gradual curve and not an acute flexion, and occupied a position extending from the posterior abdominal wall, near the outer border of the right kidney, to the junction of the first and second portions of the duodenum, and from this point downward, entirely concealing the descending portion of the duodenum, and firmly bound down to it. In this instance the gall-bladder lay between the two folds of the gastro-hepatic omentum, the free border of which extended well to the right from the anterior margin of the right lobe of the liver to the hepatic flexure of the colon.

In the above five instances the irregularities were presumably congenital, as no evidence of previous inflammation could be detected.

Nine cases, however, were observed where, as a result of a severe inflammatory process, marked changes in the relations of the neighboring viscera had taken place. In seven of these, in which the conditions were practically identical, the gall-bladder was found to be adherent to the first and second portions of the duodenum, the transverse colon, and omentum, rendering access to the ducts and duodenum for purposes of exploration or operation difficult, and only possible after considerable dissection. In two instances the gall-bladder was firmly bound down by adhesions to the duodenum only; in one of these to the first, and in the other to the first and second portions, the former rendering surgical access to the ducts, the latter to the duodenum difficult.

Regarding the size of the gall-bladder, the writer found considerable variation,—the smallest measuring $1\frac{1}{2}$ inches in length, while the largest measured 6 inches.

Nine might be classed as small, measuring $2\frac{1}{2}$ inches or less, while twelve were large, measuring 5 inches or more. The length of the remaining seventy-nine was between $2\frac{1}{2}$ and 5 inches, the average length being $3\frac{4}{5}$ inches.

Twelve of the 100 gall-bladders contained calculi, the number varying from one to 250. In three of these the stones were jet black, small, and of an irregular mulberry shape; the others were of the ordinary kind.

Ducts.—While the position of the cystic and common ducts was found to be fairly constant, both with relation to each other and to the neck of the gall-bladder and the first portion of the duodenum, considerable variation was found in the length of each. The cystic duct was measured in each of the 100 subjects, and its length found to vary from $\frac{1}{2}$ to $2\frac{1}{2}$ inches. In one instance it was $\frac{1}{2}$ inch in length; in three instances it was $\frac{3}{4}$; in fifty instances it was 1; in twenty-one instances it was $1\frac{1}{4}$ inches; in seventeen instances it was $1\frac{1}{2}$; in three instances it was $1\frac{3}{4}$; in four instances it was 2; in one instance it was $2\frac{1}{2}$, the average of the 100 cases being $2\frac{1}{5}$ inches.

The length of the common duct varied from $1\frac{1}{2}$ inches to

$4\frac{3}{4}$. In one instance it was $1\frac{1}{2}$ inches; in three instances it was $1\frac{3}{4}$; in three instances it was 2; in three instances it was $2\frac{1}{4}$; in eleven instances it was $2\frac{1}{2}$; in four instances it was $2\frac{3}{4}$; in thirty-two instances it was 3; in six instances it was $3\frac{1}{4}$; in twenty-six instances it was $3\frac{1}{2}$; in five instances it was $3\frac{3}{4}$; in five instances it was 4; in one instance it was $4\frac{3}{4}$.

The average length of the common duct being, in the 100 subjects, 3.08 inches.

The cystic duct, owing to the spiral valve formed by the mucous membrane, rarely permits the passage of a probe, while in the hepatic and common ducts, which possess no such valvular arrangement, probes even of large size pass in either direction with the greatest freedom.

To test the frequency and ascertain, if possible, the conditions under which the cystic duct becomes so altered as to freely admit the passage of a probe, an attempt was made in ninety-seven subjects to pass a soft metal probe from the gall-bladder through the cystic duct into the common duct. In only ten instances was this possible. Of the ten in which the probe passed freely, 5 to 50 per cent. presented calculi in the gall-bladder, while of the eighty-seven in which the probe could not be passed, seven or only 8 per cent. showed calculi.

In the five cases which freely allowed the passage of a probe, but which did not exhibit the presence of calculi in the gall-bladder or ducts, the patency of the duct was in such marked contrast to the great majority of cystic ducts examined, that one was strongly impressed with the possible previous existence of calculous disease in these cases, and while further investigation is needed to determine this question the writer feels justified in stating that a degree of patency of the cystic duct, sufficient to allow the easy passage of a probe, is in all probability a pathological condition.

A condition of moderate or marked gastro-enteroptosis was found in four instances. In all of these the third or transverse portion of the duodenum lay above the first, the second portion passing upward rather than downward. In one of these subjects the liver extended downward to the iliac

crest, absolutely concealing the duodenal and duct regions, a condition which would practically preclude any operative procedure on the duodenum or ducts.

Duodenum.—The second portion of the duodenum was opened and explored in seventy-seven subjects.

The object of this investigation was to find, if possible, some landmarks by which the papilla could be easily located, to educate the tactile sense, so that it could be easily recognized when concealed from view, be brought to the surface of the wound for exploration, for the introduction of a probe, or for the removal of a calculus situated low down in the common duct, as recently suggested by Dr. McBurney, of this city.

The results of the writer's observations upon the duodenum were reported to the Association of American Anatomists, at their recent meeting in this city, in a paper entitled "A Report on the Surgical Relations of the Duodenal Orifice of the Common Bile-Duct," from which a portion of the following is quoted:

The difficulty in recognizing the duodenal orifice of the bile-duct, even in specimens which have been removed from the subject and examined in a strong light, is well known to most demonstrators of anatomy. To recognize the papilla and duct through a comparatively small opening in the bowél, at the bottom of a deep abdominal wound, when not rendered prominent by the presence of a calculus or other foreign body, would, to the beginner in the surgery of this region, be accompanied by many difficulties and embarrassments.

It was found in the great majority of instances to be difficult to recognize the papilla and orifice of the duct by sight, even after a very free incision into the gut, owing to the large number and size of the valvulæ conniventes in this region, as well as the presence of a considerable amount of fluid intestinal contents, and in not a few instances from ten to thirty minutes search was required before the papilla was located and the probe introduced.

After the examination of a number of subjects in which

this difficulty was encountered, it was found that the papilla could be much more readily recognized by the sense of touch when the forefinger was introduced into the intestinal wound and the inner and posterior portions of the duodenal wall were explored.

Quite early in these investigations it was noted that, when the incision into the bowel was made just below the junction of the first and second portions of the duodenum, the edges of the wound separated by the finger and thumb of the operator, and the tissues drawn slightly upward, a marked prominence was noted of the inner and posterior portions of the mucous membrane at the point of juncture of the ascending and descending portions of the gut. This prominence was found to be a fold of mucous membrane made by the rather sharp flexure of intestine at this point. It was crescentic in appearance, owing to the cylindrical shape of the gut, and this crescentic shape was markedly accentuated by the upward traction of the edges of the wound.

It was afterwards found that, in searching for the papilla, if the forefinger of the left hand was introduced into the descending portion of the duodenum and directed obliquely inward and backward, the papilla was usually felt when the finger was carried downward to a point where the fold described above rested opposite the middle of the second phalanx,—in other words, that the position of the papilla was, as a rule, easily located at a point from one and a quarter to one and a half inches from the centre of this fold.

After these observations were made, and this fold constantly used as a landmark in locating the position of the papilla, its rapid recognition becomes simplified, and the time occupied in locating it greatly diminished.

It seemed to the writer, therefore, that this fold, to which he has ventured to suggest the name of the *falciform fold*, or process of the duodenal mucous membrane, bears a fairly constant relationship to the internal orifice of the common bile-duct, and may be depended upon as a guide when searching for this point in surgical operations.

In justification of this claim the writer begs to submit the following facts: The number of subjects in which the falciform process of the duodenal mucous membrane was noted and measurements taken to demonstrate its position with relation to the pyloric orifice of the stomach was seventy-seven. Distance of the falciform process from the pylorus, roughly measured on the finger and afterwards carefully remeasured by the graduated probe, was as follows:

In four instances it was $3\frac{1}{2}$ inches; in three instances it was 3; in one instance it was $2\frac{3}{4}$; in seven instances it was $2\frac{1}{2}$; in five instances it was $2\frac{1}{4}$; in thirteen instances it was 2; in thirteen instances it was $1\frac{3}{4}$; in seventeen instances it was $1\frac{1}{2}$; in four instances it was $1\frac{1}{4}$; in eight instances it was 1 inch.

In the seventy-seven cases, therefore, the average distance of the falciform fold of mucous membrane from the pylorus was 1.89 inches. Measurements were also taken to determine the distance from the centre of this fold to the duodenal orifice of the common bile-duct, with the following result:

In one instance it was 3 inches; in six instances it was 2; in six instances it was $1\frac{3}{4}$; in twenty-eight instances it was $1\frac{1}{2}$; in thirteen instances it was $1\frac{1}{4}$; in nineteen instances it was 1 inch; in four instances it was $\frac{3}{4}$,—the average distance in the seventy-seven cases examined was 1.36 inches.

The writer is aware that if, in an ordinarily injected subject in the dissecting-room, a longitudinal incision is made in any portion of an adherent part of the intestinal tube, and the edges of the wound drawn sharply upward, that a crescented transverse fold of mucous membrane will appear, the centre of which will be immediately opposite the wound; and quite early in these experiments it occurred to him that the fold described above might be purely an artificial production.

To ascertain the correctness of this view, six subjects were injected with 10 per cent. formalin and allowed to remain undisturbed until the tissues were thoroughly hardened. Dissection was made to reveal the exact appearance of the duodenal mucous membrane, and in every instance a cres-

centic fold of mucous membrane was found on the inner and posterior aspect of the tube, at the junction of the ascending and descending portions, or a little less than two-thirds the distance from the pylorus to the papilla.

External Landmarks.—In order to preserve the integrity and muscular tone of the abdominal wall, after operation, the incision, when made in a region other than the median line, should be so planned as to avoid dividing the lower intercostal nerves, which supply the abdominal muscles. These nerves, as is well known, emerge from the intercostal spaces and pass downward and forward towards the median line, lying between the internal oblique and transversalis muscles, until their terminal branches pierce the sheath of the rectus muscle, which they supply. In order to determine with a fair amount of accuracy the relative position of these nerve-fibres, the writer made a number of dissections with reference to this point.

The first of these dissections was made by my prosector, Mr. Philip Van Ingen, of the College of Physicians and Surgeons. The subject was specially prepared by being injected with formalin to harden the tissues and to render improbable variations in the normal relations of the muscles and nerve-trunks to the bony landmarks.

The results of this dissection were carefully noted, and afterwards verified by the writer on about one dozen other subjects, and although the writer is aware that these observations would be rendered entirely valueless by certain conditions, such as great abdominal distention, obesity, or deformities from spinal disease, yet the results are given for what they are worth:

It was found that the course of the twelfth dorsal nerve would be accurately indicated by a line drawn from a point one-half inch below the tip of the twelfth rib to the spine of the pubis on the opposite side; that the position of the eleventh dorsal nerve would be indicated by a similar line drawn from a line one-half inch below the tip of the eleventh rib to the middle of Poupart's ligament on the opposite side; that of the

tenth dorsal nerve from a point half an inch above the tip of the eleventh rib to the anterior superior spinous process of the opposite ilium; that the course of the ninth nerve would be indicated by a line drawn from a point just below the osseochondral junction of the ninth rib, horizontally towards the median line. That the eighth intercostal nerve would follow a line drawn from a point immediately underneath the costal origin of the eighth cartilage, passing horizontally outward to a point one-half inch to the inner side of the chondral border, the upward parallel with that cartilage, to a point near its junction with the sternum, lying, throughout its entire length, about half an inch to the inner side of its margin. Each of these nerves, as it approaches the sheath of the rectus, divides into two branches, one continuing in the course of the line, indicating its general direction, while the other passes transversely inward, or inward and upward, and enters the sheath, from one-half to one inch above its fellow. It will then be seen that any incision which exposes the gall-bladder and ducts sufficiently to carry on any operative procedure, must necessarily divide one or more of these nerve-trunks. If, however, we employ the straight incision through the rectus muscle near its outer border, extending from a point one-half inch below the free border of the eighth costal cartilage to a point two inches above the umbilicus, or the curved incision, parallel to the free border of the costal cartilages, extending from a point just below and outside of the ensiform cartilage, and carried downward and outward to a point just above the emergence of the tenth nerve, only one—the ninth intercostal nerve—need be divided. Or if this incision is not sufficiently generous to give free access to the parts, by a little careful dissection and an accurate knowledge of the position of the tenth nerve, it can be retracted and the incision somewhat extended without its division.

INSPECTION OF THE ABDOMINAL CAVITY AND ITS VISCERA IN POST-MORTEM.

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IN these modern days, when even the first-year graduate announces himself fully competent to do general practice and all kinds of abdominal surgery, it may be well to pause awhile and look over some landmarks in the abdominal cavity. It is very evident from journal articles and medical society remarks that every abdominal surgeon has not had ample opportunity and uninterrupted leisure to inspect the abdominal viscera of many subjects, human or otherwise.

One of the best tests of a physician's practical knowledge of the abdominal viscera is aptly demonstrated in his method of conducting an autopsy. With the abdomen well open before him by a long crucial incision, it will quickly dawn on his mind that it requires the broadest knowledge of medicine to correctly interpret anatomic data and visceral lesions. To perform carefully 100 autopsies on the abdomen makes a physician less dogmatic and more wise in diagnosis, more charitable to his colleagues' opinions, less dogmatically certain of his own, and also a safer and better abdominal surgeon. Abdominal autopsies are a stimulant to the investigator, instructive to the wise, and a check to the hasty. A diagnosis in the abdomen is more difficult than in any other serous cavity; so are its autopsies more instructive. Abdominal post-mortems often reveal what might have been.

The position of the organs will attract the first attention. Before they are disturbed careful observation should be made

of the normal and abnormal. The untrained eye does not discriminate and the unskilled hand acts ruthlessly in regard to position of viscera. The most natural and, perhaps, the most systematic is to note the position of the great omentum, if it be in view. However, many times in a hundred autopsies it will be entirely out of sight. In many cases it will be found rolled up above the transverse colon and occasionally under it. Once in ten cases, perhaps, it may cover the cæcum, and perhaps it will reach well into the pelvis in twenty cases out of one hundred. The great omentum is a valuable peritoneal veil; it may present many cicatrices showing old peritonitis. It prevents the invasion of infection and circumscribes inflammations. It is like a man-of-war, ready at a moment's command to sail to invaded parts. It is the great peritoneal protector and withal the surgeon's friend, burying the mischief his hands has wrought. It tends chiefly to the left, and may be found in the hernial rings two or three times in a hundred subjects. It may show by old inflammation where it has checked peritonitis in the great peritonitic regions,—viz., pelvic, appendicular, and gall-bladder region,—all can be observed by inspection. The interpretation of the position and inflammation of the omentum will depend on a man's knowledge. The omentum majus is an excellent organ for plastic peritoneal surgery, for patch-work in visceral lesions. Visceral lesions should not only be discovered, but reasonably interpreted. The position of the viscera vary considerably.

After reflecting the omentum majus upward, in certain cases, parts of the whiter colon, cæcum, loops of the transverse colon, and sigmoid flexure may be seen projecting through the coils of the darker enteron in the middle of the abdomen. In such cases the mesocolon and mesosigmoid are generally very long, and the peritoneal pedicle of the ileo-cæcal apparatus is also abnormally elongated. The appendix in such cases lies among the coils. An autopsy should be conducted systematically and in the enteron in the area of dangerous peritonitis; thus habitually following a plan, one is not likely to overlook matters. I generally next take up the

appendix and gently push the bowel coils to one side until one sees this fading remnant in its uncertain position. It hangs over the pelvic brim or on the pelvic floor in a quarter of the cases. In other subjects it lies posterior to the cæcum or immediately behind the entering ileum. It may be curled up at the lower end of the sacrum. Its varying position is an instructive lesson to the diagnostician and surgeon.

The position of the appendix is a very important matter, as on its position depends largely the vicious diseases afflicting it. In general it has two positions,—viz., (a) lying at some point on a line extending from the lower surface of the liver to the pelvic floor; (b) in the coils of the enteron (small intestine).

Again, the most significant relation of the appendix is with the right psoas muscle, as muscular trauma causes much appendicitis by inducing the appendicular germs or their products to migrate through its mucosa muscularis to its serosa, inducing peritonitis. If the appendix lies on the psoas, it is liable to be traumatized at any time by vigorous muscular action. The appendix lies on the psoas much more frequently in man than in woman, and man's psoas activity is more vigorous than woman's, while in woman the appendix drops into the wide pelvis or to the right of the psoas, hence the position of the appendix in relation with the psoas explains the greater frequency of appendicitis in man over woman.

The next organ to examine is the cæcum, whose position may be at any point from under the liver to the floor of the pelvis. Its general position is on and to the right of the psoas muscle, about the middle of Poupart's ligament. A frequent condition arises which enables the cæcum to gain almost the median position of the abdomen, at least the cæcum frequently lies against the right of the lower lumbar vertebræ. The cause of this remarkable position is a partial mesenterium commune,—i.e., a short piece of the lower end of the ascending colon has more or less of a mesentery, and this joins with the mesentery of the lower end of the ileum, and together

they endow the cæcum with a remarkable freedom which enables it to gain the median point of the abdomen, the point of least resistance. This may occur some half a dozen times in a hundred subjects. I met once with an almost complete mesenterium commune in 100 autopsies.

Next follow the colon dextrum to the liver. Normally it has no mesentery, and lies onto the inner edge of the right kidney. If it has a mesentery, it will be in position according to the length of its mesentery. The right colon may have no mesentery at all or one on its entire length. Its mesentery is practically divisible into three segments,—viz., one below the kidney, one on the kidney, and one above the kidney. On the outside of the ascending colon, at about its middle, is a band of peritoneum which I have termed the ligamentum phrenico-colicum dextrum. This peritoneal band extends from the colon to the diaphragm, and, from my investigations in embryos, its origin is due to the lower pole of the right kidney projecting a fold of peritoneum as the cæcum descends. It is undoubtedly Huschka's ligamentum intestinæci. The band is useful in retaining in position the cæcum and right colon,—*i.e.*, it does not allow them to descend into the pelvis so frequently. I have often noted in subjects the ligamentum phrenico-colicum dextrum elongated over six inches, allowing the cæcum to rest on the pelvic floor. Again, on the right side of the ascending colon may frequently be observed a fixation of the colon due to old peritonitis in Haller's omentum. This fixation lies over the transverse portion of the duodenum, and is due, in my opinion, to the invasion of infection through the duodenum into Haller's omentum. The ligamentum phrenico-colicum dextrum and the fixation of Haller's omentum has much to do with the position of the cæcum and ascending colon.

The examiner has now arrived at the so-called hepatic flexure (flexura hepato-colicum). This is one of the great peritonitic regions, and the old inflammations will influence the position of organs. The sources of inflammation in this (gall-bladder region) locality must be looked for as invasion

from the flexure of the colon, the gall-bladder, the pancreas, adrenal, kidney, the pylorus, and the upper portion of the duodenum.

The position of the flexura hepato-colicum is greatly modified by the ligamentum hepato-colicum,—a structure which is purely an extension of the ligamentum hepato-duodenale. I now use as a standard of measurement of the ascending colon the ligamentum hepato-colicum instead of the uncertain hepatic flexure of the colon. The hepatic flexure is very uncertain, as it frequently represents congenital bends or loops which are probably a species of atavism to the rodents or solipeds who possess these peculiar colonic loops in adult life, or a modification of the ligamentum hepato-cavo-duodenale.

The transverse colon has a varied position, as it has a varied length, measuring from fifteen to forty inches. Its position is very various on account of the very uncertain bends at each end, but especially at the flexure hepato-colicum.

Its long bends may reach into the pelvis, and I have found it lying on the pelvic floor, but in general its mesenteries are four inches and its bends do not extend below the iliac crest. Post-mortem rigor may contract it in segments, but it is more frequently distended (partially paralyzed). The transverse colon in general is too long for a straight course, and it must needs form bends to accommodate itself to environments. The flexura coli-lienalis is a sharp angle, higher than the hepatic and nearly always accompanied by old or recent peritonitis. The position of the left colon is along the left lumbar region to the left of the kidney. It almost never has a mesentery, and but little inflammation around it. It ceases at the outer edge of the psoas muscle, whence it crosses that muscle, becoming the S romanum.

The position of the sigmoid is a very uncertain matter. It may be among the small intestines or on pelvic floor. I have found its loop touching the diaphragm at the cardiac end of the stomach and even to the right of the vertebral

column. In eighty per cent. of adults it showed old peritonitis in its mesosigmoid. This peritonitis in the mesosigmoid I have attributed to the action of the psoas muscle on the bowel, inducing the sigmoid loop, which is often full of bacteria and rough faecal matter, to allow the microbes to invade serous membrane through the bowel wall. Muscular trauma on a bowel containing virulent germs will induce migration and peritonitis. In inspection it should be remembered that sixty per cent. of volvulus occurs in the sigmoid; that much cancer and many strictures arise in this loop. The inspection of the abdominal viscera may now be directed to the stomach, which is so liable to be changed in position and condition by previous disease. One can note the stomach in all positions from the almost vertical one to the position of extension into the pelvis. Inspection shows dilatation or prolapsus, the general forces which change the position of the stomach. It is frequently to be noticed that distinct lymphangitis may be observed spreading out under the peritoneum like the branches of a tree. When Professor Lesshaft wrote that, after examining over 1200 bodies, he concluded that the stomach was vertical, he was absolutely correct, if he took as his standard the lesser stomachic curvature. Its obliquity or transverse positions depends on the increase in the direction of the greater curvature. The cardiac bulge and greater curve expands and develops by use, while the pylorus and œsophageal ends are fixed, and thus do not get activity from food, on the lesser curve it remains vertical. One may find in a woman the stomach constricted in the middle (congenital atavism to herbivora) or contracted to the size of the colon. Look for disease of the stomach at the pylorus, or œsophageal extremity,—the sphincters.

The liver is the halting-post of all beginners. Its position depends on its size and the elongation of its ligaments. Its connection to the stomach by the gastro-hepatic omentum generally induces the pathologist to inspect it with the stomach. Hypertrophy, atrophy, malignancy, tubercule, echinococcus, and infection (abscess) may modify its position.

The liver may extend from the right dome of the diaphragm to the left on account of the varying size of the left lobe. The interpretation of the various conditions of the liver microscopically, and the correct interpretation therefrom, is a very difficult matter and only attained by long practice in autopsy. It is common to observe the lower edge of the right lobe extending below the iliac crest, and then, of course, passing in front of the left kidney. The gliding of the liver in front of the kidney saves the kidney from being forced ahead of the liver into the right iliac fossa. Macroscopically, perhaps, no organ can show as varied changes as the liver. The enlargement or prolapse of the liver is generally accompanied by an inflammatory condition of its ligaments (suspensory, coronary, or gastro-hepatic); at least one observes a typical lymphangitis in the left coronary and at the base of the suspensory ligaments of the liver. The inflammation on the ligamentum hepato-duodenale generally is due to invasions of infection from the hepatic flexure, gall-bladder, duodenum, or pylorus.

To inspect the pancreas, tear through the gastro-colic omentum or lift up the colon and tear through the mesocolon transversum or tear through the gastro-hepatic ligament. The inspection of the pancreas from any of the above three routes is good, but the best route is through the gastro-hepatic omentum. The chief diseases of the pancreas are to be looked for in its head, due to infective invasion from the duodenum. The pancreas may show cystic dilatation or atrophy from obstruction of its duct. It may show the chief changes from the inflammatory action that other visceral glandular organs show,—viz., parenchymatous or interstitial diseases. Cancer is generally secondary.

The spleen may be looked for between the ninth and eleventh rib. It is extremely variable in size and position. I have noted it in autopsies all the way from the ninth rib to the floor of the pelvis. In one case I saw the spleen lying on the pelvic floor with an elongated, narrow pedicle whose sides were made smooth by twisting and rotating to and fro. Its

pedicle was covered with white cicatricial peritoneal patches,—residual patches from peritonitis.

The wonder was that it did not rotate on its round, thin pedicle and produce strangulation of its veins especially and finally of its arteries. As this spleen passed into the pelvis it travelled in front of the transverse colon. So far as my experience goes 95 per cent. of adult cases are afflicted with perisplenitis. This is no doubt due to its proximity to the moving diaphragm and stomach and to the flexura colilenalis, and to the degenerations of blood-vessels due to varying congestions.

The small intestines (the enteron) may now be inspected. They mainly exist irregularly along the lumbar region, in the left iliac fossa, and in the pelvis. Their chief position is in an irregular pocket in the left lower abdominal cavity. Observe that the loops are absolutely irregular, without order as regards location, and change from day to day. The enteron practically fills the colonic square. It is some twenty feet long, with a six and one-half inch mesentery, and the middle seven feet has the longest mesentery. It will herniate in about ninety-seven times out of 100 subjects,—*i.e.*, the mesentery is long enough to allow a bowel loop to engage in a hernial ring. The inspection, which shows large mesenterial glands, will suggest typhoid fever or tuberculosis, which are the chief diseases producing typically enlarged glands. In autopsies, the subjects of which have died of brain-disease especially, one occasionally finds from one to four invaginations after death,—intussusceptions. They are non-inflammatory and occur, perhaps, during the death struggle, when the cerebro-spinal system lost control and the intestinal peristalsis became irregular, wild, and disordered, causing invaginations of the enteron. Now lift the coils of enteron out of the pelvis and inspect the bladder, rectum, and genitals. If it be a male, inspect the seminal vessels, which show some 15 to 20 per cent. of gonorrhœal diseases. If it be a female, first look at the ends of the Fallopian tubes, whence the in-

fection starts to invade the pelvis,—80 per cent. of adult females suffer from pelvic peritonitis.

The kidneys demand inspection. The right is lower than the left, which touches the iliac crest. The position of the kidney is very varying, especially in spare, parous females. The right kidney is very movable, gliding up and down several inches. The causes of movable kidney are generally (a) absorption of perirenal adipose tissue; (b) rapidly repeated pregnancy; (c) in labor the liver shoves the kidney downward; (d) subinvolution of the genitals and consequent subinvolution of the urinary organs; (e) too early rising after labor; (f) especially tight lacing, which forces the kidney towards the centre of the body and out of the renal bed; (g) the longer renal artery on the right side; (h) heavy lifting; (i) rapid loss of fat; (j) pendulous abdomen; (k) visceral prolapse; (l) occasionally enlarged liver.

The interpretation of abdominal visceral lesions requires the broadest knowledge of pathology and medicine. The conduction of an autopsy is one of the best tests of a man's practical knowledge either of diagnosis or surgery in the abdomen. Even some of those who pretend to do skilful pelvic surgery will conduct an autopsy of the abdomen with striking apparent awkwardness.

Autopsies teach the significance of visceral ptosis, of dislocated viscera, where disease and peritonitis arise. They indicate the signification of the landmarks of the tractus intestinalis, its sphincter and flexures.

Abdominal post-mortems suggest many valuable points in diagnosis and differential diagnosis.

The use of the colon in the diagnosis of abdominal lesions is one of the simplest and most efficient means to make a close probable diagnosis before abdominal exploratory incision.

In the diagnosis of abdominal disease pathologic data and clinical data do not always apparently correspond.

The colon shows a square which contains the enteronic loops and the pancreas; the gall-bladder, liver, stomach, spleen, and perhaps the kidney will be either outside the

colonic square or at least will show their relations through the colon.

Now, if the empty colon be distended with air by a common bulb-syringe it will distinctly mark out whether the tumor be within or without the colonic square.

The distended colon will aid especially to exclude the liver, gall-bladder, spleen, and stomach.

It will aid in diagnosing the kidney relations. If the tumor lies in the colonic square, tumors of the mesenteron, omentum, and enteron must be considered. Insufflation of the colon is a great aid in the diagnosis of abdominal tumors.

If the pancreas be involved, it will in general force the transverse colon downward.

NOTES ON CANCER OF THE FUNDUS UTERI.¹

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DURING the four years 1894, 1895, 1896, and 1897 I have had an opportunity of observing eleven cases of cancer of the fundus uteri.

It is said in some of the works on gynæcology, such as Hart and Barbour, that cancer of the fundus uteri occurs in a proportion of 2 per cent. of cancer of the cervix. This I have never found to be the case, and I believe that the observers who made such records must have failed to recognize many cases of cancer of the fundus. In my experience at the Gynécéan Hospital, and at the University Hospital, the percentage of cases of cancer of the fundus is very much greater than 2 per cent. In the period during which I have observed the eleven cases of cancer of the fundus here reported I have records of sixty-seven cases of cancer of the cervix, therefore, in my experience, cancer of the fundus has occurred in the proportion of 16 per cent.

In looking over my case-books, in order to determine the total number of cases of cancer of the fundus uteri, I have been forcibly struck by one fact of great interest, and that is, the rapid diminution, in my experience at both the University and the Gynécéan Hospitals, of cancer of the cervix. In my last case-book, in which the records of 250 patients are kept, I find only eleven cases of cancer of the cervix. In the case-book immediately preceding this, containing also 250 patients, I find twenty-seven cases of cancer of the cervix.

¹ Read before the Philadelphia Academy of Surgery, March 6, 1899.

Many of my friends in gynæcological practice have spoken to me of a similar diminution in the number of cases of cancer of the cervix which now come under their observation. As I believe that the total number of cases of cancer of all kinds is increasing at a rather rapid rate, I think that we must attribute this diminution in the number of cases of cancer of the cervix to the fact of the very wide use of the operation of trachelorrhaphy.

My cases of cancer of the fundus uteri may be briefly recorded as follows:

CASE I.—W. R., complete abdominal hysterectomy, March 13, 1894. Now in good health with no signs of recurrence.

CASE II.—D. H., complete abdominal hysterectomy, October 25, 1895. No recurrence.

CASE III.—A. P., abdominal hysterectomy complete, March 24, 1896. No recurrence.

CASE IV.—L. H., complete abdominal hysterectomy, May 24, 1896. No recurrence.

CASE V.—Mrs. S., complete abdominal hysterectomy, February 13, 1897. No recurrence.

CASE VI.—R. R., complete abdominal hysterectomy, March 10, 1897. No recurrence.

CASE VII.—E. B., complete abdominal hysterectomy (operation by Dr. Braldu), January 5, 1897. No recurrence.

CASE VIII.—S. S., refused operation, September 11, 1895. Died of exhaustion several months later.

CASE IX.—M. F., cœliotomy, October 13, 1893. Case found to be inoperable on account of intestinal involvement. Died of exhaustion several months later.

CASE X.—R. D., cœliotomy, inoperable. Died of exhaustion in few months.

CASE XI.—D. B., October 1, 1897, incurably insane. No operation considered advisable. Still living.

It will be observed that seven of the eleven cases were submitted to operation. The first operation was performed five years ago, and the last operation was performed about two years ago. All the patients recovered from operation.

I have, during the past two weeks, heard from all of these women and from the attending physicians of most of them. They are all in good health, with no indications whatever of a recurrence of the disease.

The ultimate results in operation for cancer of the fundus, as illustrated by the cases which I have reported, are certainly very much more favorable than the results of operation in cancer of the cervix, and I think that these results in cancer of the fundus are superior to the results in operation for malignant disease in any other part of the body.

In my experience with hysterectomy for cancer of the cervix, the results have been most unsatisfactory. I have the record of one patient, where the disease primarily affected the mucous membrane of the cervical canal and had not extended through the body of the cervix, on whom hysterectomy was performed, and no recurrence had taken place at the end of two and one-half years. In another case of cancer affecting the vaginal aspect of the cervix and a portion of the anterior vaginal wall, in which the uterus and part of the bladder was removed, there was no recurrence of the disease at the end of three years, when I closed by plastic operation the opening in the bladder. With the exception of these two cases, I can recall no other patient in whom recurrence has not taken place.

OPERATIVE RELIEF OF VESICO-RECTAL FISTULA.¹

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IN March, 1891, at the age of six, a boy, G. G., was cut for stone through the perineum, after which he was found to have a fistula between the bladder and rectum from which the urine constantly dribbled away. In November, 1891, eight months afterwards, another surgeon operated to close the fistula, but without success. At intervals, during the following year (1892), the same surgeon made four other attempts to close it, but all proved failures. From the latter part of the year 1892 until January, 1898, no effort was made to relieve his very unfortunate condition. When he was brought to me, in January, 1898, being now thirteen years old, his general health was beginning to suffer. He had been going to school, but could not take a great deal of exercise. Had frequent colds and attacks of bronchitis. His parents were compelled to live near the school, so that he could run home every hour or two and have his napkins changed. In spite of remarkably diligent efforts on their part to keep him clean, he was a good deal of an offence to himself, his teacher, and fellow-pupils. Upon examination, I found the buttocks in the anal region badly excoriated and the seat of numerous pimples and boils. The anus was slightly gaping at its anterior part, the perineum having been in large part destroyed, so that there seemed to be very slight depth of tissue between the urethra and anus, or rather this scar tissue which lined the anterior circumference of the anus up the bowel to the fistula.

Upon dilating the anus slightly and with reflected light the fistula, as large as a small finger-nail and circular in shape, could be easily seen, situated slightly above the internal orifice of the

¹ Read before the Southern Surgical and Gynæcological Association, December 8, 1898.

urethra. The prostate gland could not be made out, except that the bladder and urethra were slightly thickened at this point. After five days preparation of emptying the bowel and giving astringents, coupled with starvation, with a view to preventing the bowel from moving and infecting the stitches with fæcal matter, he was etherized, and the fistula pared and closed with fine silver sutures, put transversely and about one-eighth of an inch apart. A small elastic catheter was left in the bladder forty-eight hours. The catheter caused a great deal of urethral irritation, and became so encrusted with lime-salts as to be difficult of removal. In spite of our precautions there was a fæcal passage on the second day, and on account of this, probably, the wound entirely broke down on the third day. Five days after this the stitches were removed, encrusted with lime-salts, and he was sent home.

He was admitted again three months later, on April 21, 1898, at which time the fistula was found to be still about one-half inch in diameter. There had been, up to this time, in all six attempts to close this opening, and it seemed to me useless to try further as long as the same certainty of infection by the fæcal matter remained.

I had been unable to find any mention of such a condition in any of the text-books, and was somewhat at a loss to decide whether or not I would be justified in making a temporary colostomy. About this time I heard that this condition (or rather a recto-urethral fistula) had been successfully treated in this way by Dr. J. P. Tuttle, of New York. I decided to do this, and also to make an epicystic opening to drain away the very septic urine.

These operations were done on April 30, at one sitting, as a preliminary measure. A loop of the sigmoid was taken up through an incision in the left iliac region, and a silkworm-gut mattress suture was passed beneath it through the skin, mesentery, and skin, and back again. When firmly tied, this drew the skin on either side close against the mesentery, and served the purpose of the glass spool or strip of gauze commonly used. This suture supported the loop as well as prevented the possibility of a strain on the tight stitches with which the bowel was next closely fastened all around to the peritoneum and fascia. The bowel was immediately opened longitudinally with a knife for a distance of nearly two inches; no bleeding followed to speak of. The bladder was then opened in the following rather novel man-

ner: A thin rubber bag, devised by Dr. J. G. Clark for making applications to the mucous membrane in the female bladder, was inserted into the bladder through the fistulous opening in the rectum. This bag being distended with air made this operation of epicystotomy probably the easiest one ever performed. Having the bag distended, the bladder when cut into did not collapse, of course, as it would have done had it itself been filled with air or water. The bladder walls, after being cut through to the extent of three-fourths of an inch, were stitched with all possible ease to the skin on either side of the wound. Following this etherization the patient had ether pneumonia, which I shall speak of again later.

Ten days later, on May 9, the fistula was again attacked. The bowel and bladder having been thoroughly irrigated daily since they were opened, and having performed their functions without any trouble at all, the edges of the opening were again freshened as before. The rectum being first dissected away above and to either side in a crescent-shaped flap, the wound was closed transversely with silk and the rectal mucous membrane brought down and sewed over this. The wound again broke down completely about the sixth day, the sutures in the rectal portion giving way entirely. The stitches were removed ten days after the operation, when the fistula was found to be very much smaller. On May 25 the fistula was found to be still smaller, and was again closed in the same way as before, except that I used silkworm gut. A catheter being introduced through the urethra and the bladder kept constantly washed, the water returning through the fistula and keeping the field clear of blood. At the end of six days the fistula was again leaking and the stitches were again removed, and the boy was sent home. The epicystic fistula had closed, but the fæcal opening was left until further attempts had been made to cure the opening in the bladder below.

He was admitted again on September 9, and on September 12 he was again etherized, and the fistula was found so small as to admit a pinhead-sized probe with difficulty. This time, after paring out the fistula (I think, perhaps, I should have tried touching it with the cautery this time), I introduced the stitches vertically with the body instead of transversely, as I had done each time before. This was bad judgment. I ought to have been satisfied with finding the fistula smaller after each opera-

tion. Had I been so and introduced the sutures this time, as I had before, transversely, I feel sure it would have been cured. I think, undoubtedly, this drawing down the base of the bladder and closing the fistula with it caused the wound to tend to pull open each time the bladder contracted. This was borne out, I think, by the fact that when the wound broke down it left the opening almost as large as when I first operated upon it.

On October 31 I operated again, and this time made a success of it. I made a rather more extensive dissection of the rectal wall from the bladder above, and cut through the scar tissue below in the urethra for about one-half inch. This left the fistula something over an inch long; about two-thirds of it being in the bladder and the other third in the urethra. It was closed with silk, the ends of which were left one inch long. The rectal wall was closed over this, except at the lowest angle, where the inch-long inner stitches were drawn through for drainage. Following this operation both the bladder and bowel united at every point.

Seventeen days later (November 17) I operated to close the artificial anus. The bowel was dissected from the skin and surrounding scar tissue down to the peritoneum, but not through it at any point. The spur, which seemed to be about three-fourths of an inch deep, was cut through with the scissors after being ligated step by step on either side after the manner of tying off the broad ligament. The bowel was then sutured transversely (it will be remembered it was opened longitudinally), the prolapsed mucous membrane being turned into the bowel by taking Lembert sutures through the muscular and submucous layers. The serosa had disappeared from this exposed bowel down to the peritoneal adhesions. The skin was then brought over and united with a continuous, buried, silk suture; a twist of catgut being left at the upper angle for drainage. This wound seemed at first to have closed primarily, as he had daily movements from the bowel without any sign of leakage for five days, it then leaked through a small opening which closed three weeks later.

There were several points of interest in this case, taking it all through, which may warrant my imposing further upon your time to summarize.

First. The astonishingly small amount of information one can gain from the text-books on this subject, when it

would seem that it must have been a very common accident in the days when the perineal operation for stone was so fashionable. E. L. Keyes, in Ashhurst's "Encyclopædia," says that it was not an uncommon accident; that "Thomson confessed to four such in his own hands," so there must have been others. He says that wounding the rectum has at times resulted in a permanent recto-urethral fistula which is very difficult to cure.

Dr. J. P. Tuttle, of New York, has recently published in the *Medical Monthly* of Louisville a paper on "Twenty-five Collected Cases of Urethro-Rectal Fistula," including two of his own. In one of his he made an iliac opening in the bowel as a preliminary.

He says, in conclusion, "Of the twenty-five cases thus reported, eight have been cured by operative and four by palliative methods. These four were all comparatively acute cases; no chronic cases have been cured by medication, stimulation, or cauterization, and we may fairly conclude that patients can expect little from this mode of treatment. Surgical authorities give us very little more encouragement from operative procedures. While it is recognized that the cases above were nearly all reported as comparatively successful, and that the percentage of cures would fall below the 33 per cent. shown here, nevertheless, they do show that recovery is possible, and that the victims of this disease should not be consigned to their fate. Finally, notwithstanding the number is very small, three consecutive successes by one operator would seem to show that there was something more than good fortune in his method, and encourage us to offer a more favorable prognosis in these distressing cases than we have done heretofore."

Keen and White's text-book mentions, as one of the dangers of the perineal operation for stone, a permanent urethro-rectal fistula, but I have been unable (after a limited search, it is true) to find any mention of a vesico-rectal fistula.

The second point of interest in my efforts with this patient was the necessity of diverting the fæcal current by

means of the artificial fistula. I doubt, very much, if the repair could ever have been done without it.

The final result proved that it was unnecessary to open the bladder above, because that opening closed after one operation, which failed, and, of course, was not open when union of the fistula was finally obtained.

There was no great difficulty in exposing the fistula nor much manipulative skill required in sewing it up. Having the patient in the Sim's position, with hips elevated, and a flat retractor against the posterior wall of the rectum, then, by putting a heavy silk ligature deeply through the scar tissue, just at the lower edge of the fistula, the field of operation was drawn down half an inch, and the operation itself made comparatively easy. Such operations, of course, were next to impossible before suitable instruments had been devised to meet the conditions.

The patient has been anæsthetized sixteen times. I myself have etherized him seven times for operation, besides giving him chloroform three times to remove stitches following the failures. He has established a tolerance for ether that is very interesting. He takes very little in going under, and, after two hours, wakes up with hardly a sign of being intoxicated even, and with no nausea at all. After the preliminary operations upon the bladder and bowel in May (it having lasted over two hours), he had ether pneumonia, which lasted four days, and then cleared up rapidly. Dr. Kelly speaks of ether pneumonia as having happened eight times in about 2000 etherizations in his practice. It is caused by an excess of bronchial mucus which gets infected and fills the small tubes and possibly the air-cells.

I think the success of the last undertaking was somewhat owing to the fact that we were able to control him about voiding his urine. Each time the effort was made to prevent his voiding it voluntarily by having him catheterized every three hours, but this was not accomplished until after the last operation. He probably more fully realized the importance of it himself, and the bladder and urethra were much more tolerant

than when he came in first. At any rate, he was catheterized every three hours, and the bladder washed out once a day for ten days.

In this condition of vesico-rectal fistula the urine is always in contact with the vesical side of the wound, even when in the smallest amount, and exerts a pressure upon the line of sutures as well as infecting them with the sediment in the bladder. Of course, such a fistula as this is more unfavorable than one opening into the urethra, which, with the aid of a catheter, can be kept entirely free from contact with the urine. I think, however, the principal reason for the last operation being successful was that it was cleaner. No fecal matter having passed that way for six months, the colon bacillus, that inevitable pus-producer, must have been absent both from the rectum and bladder, although, unfortunately, this was not verified by bacteriologic examination. Since the fistula in the rectum was closed this patient has had constant dribbling of urine from the urethra, while standing or sitting. There has been no incontinence at night, and he does not have to empty the bladder until he gets up in the morning. After voiding his urine, the dribbling from the meatus begins immediately, but in spite of this the urine collects in the bladder to the extent of two or three ounces, which is again voided in two hours. As there has been no improvement in the action of the bladder sphincter in four months, it is doubtful if he ever will have good control of it. When he voids urine the stream has no force, doubtless owing to the inaction of the bladder wall for seven years. The sphincter has been probably more or less destroyed by the original cut for the stone and by the subsequent plastic operation. It is probable, too, that his seminal ducts have also been destroyed. His general health at this time is excellent. He has gained a great deal in weight, and is more active than the average.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, January 25, 1899.

The President, ANDREW J. MCCOSH, M.D., in the Chair.

POSTERIOR GASTRO-ENTEROSTOMY WITH ENTERO-ENTEROSTOMY.

DR. GEORGE EMERSON BREWER presented a man, fifty-six years of age, who was admitted to the Surgical Division of the City Hospital in May, 1898, complaining of abdominal pain, anorexia, almost constant vomiting, progressive loss of weight, and great weakness.

The pain was severe, paroxysmal in character, would come on immediately after taking food, and would be completely relieved by vomiting.

Cancer of the stomach was suspected, and to verify the diagnosis, he was temporarily transferred to the medical service of Dr. George R. Lockwood for observation.

Two weeks later Dr. Lockwood sent him back, with the diagnosis of benign stricture of the pylorus with marked dilatation of the stomach, and advised an operation.

The first stomach washing, made by Dr. Lockwood during fasting, resulted in the removal of three quarts of sour, undigested, fermenting food. Upon dilatation, the greater curvature of the stomach was found to reach the pubic bone.

Early in June, under chloroform anæsthesia, the abdominal cavity was opened by a median incision. Near the pylorus, on the superior curvature, there was a hard cicatricial induration, encroaching upon the duodenal orifice. The stomach was enormously dilated and empty.

Through an incision in the transverse mesocolon a loop of jejunum was united to the posterior wall of the stomach by means of a Murphy button. The ascending and descending arms of the

loop of jejunum were also united by a smaller Murphy button, and the abdominal wound closed.

The wound united primarily, the vomiting and other untoward symptoms ceased at once. The patient took liquid food on the third day, and has since been well.

One Murphy button has been passed; the other is presumably still in the side-tracked duodenal loop.

The patient has gained forty pounds in weight, and has perfect digestion.

DR. WILLY MEYER said that during the past year he had done posterior gastro-enterostomy about a dozen times, in no instance, however, doing an additional entero-enterostomy, as in Dr. Brewer's case. In the majority of cases the button came away; in a few it was never found. According to statistics, the button is not found in about 30 per cent. of cases. When retained, it apparently does not give rise to any discomfort, as those patients very rarely complain of it. The speaker said that in one case under his observation the X-rays have proven the presence of the button in the stomach, where it has now been for over two years, without apparently giving rise to any discomfort. The fact should also be borne in mind that the button might be passed and easily overlooked by a careless attendant.

Dr. Meyer said the reason he had never done an additional entero-enterostomy in these cases was that he had never seen the necessity for it. Although the patients frequently vomit bile during the first week or two after the operation, this gradually subsides, and there are no digestive symptoms afterwards. As a rule, Dr. Meyer said, he regarded an additional entero-enterostomy as superfluous, a simple posterior gastro-enterostomy with the button answering the purpose in both malignant and benign cases.

DR. FRED. KAMMERER said that the superiority of posterior over anterior gastro-enterostomy had been clearly demonstrated by Carle and Fantino in their article, which was recently published in *Langenbeck's Archives*. The speaker said that, while he was an adherent of the simple suture in the anterior operation, he thought that on technical grounds the posterior operation should always be done when possible, and then with Murphy's button. He did not believe it could be well done without the button, certainly not with as much ease as the anterior operation.

Carle and Fantino, in their article, refer to the fact that the posterior operation is much less frequently followed by symptoms of regurgitation than the anterior operation.

Dr. Kammerer said that last summer he performed the posterior operation three times with Murphy's button, and in no instance did he see any untoward effects whatsoever. There was no vomiting at all, and there were no other symptoms which might have been referred to spur-formation at the seat of the anastomosis, as was so often the case when the anterior operation was done. Dr. Kammerer said he agreed with Dr. Meyer that an additional entero-enterostomy (Braun-Jaboulay) was usually unnecessary after the posterior operation.

NEPHRECTOMY FOR CARCINOMA.

DR. FRED. KAMMERER presented a man, forty-five years of age, who was first seen in August, 1898, when he had a solid tumor occupying the greater part of the left half of the abdominal cavity and extending for two inches to the right beyond the median line. A transverse incision was made from the vertebral column across the left side to the linea alba. Upon incising the peritoneum the colon was seen running over the highest point of the tumor as a flat band. The line marking the reflection of the peritoneum upon the anterior abdominal wall was situated about four inches to the left of the descending colon. The latter was easily separated from the tumor, but the eleventh and twelfth ribs had to be removed to facilitate manipulation with the upper part of the growth. In attempting to get at the pedicle of the tumor containing the vessels severe hæmorrhage was encountered from large veins. Finally a large clamp was placed on a mass of tissue and the kidney removed. It weighed six pounds. The different layers of the abdominal wall were sutured in tiers. The patient made an uninterrupted recovery. The tumor was found to be a carcinoma, and during the operation several infected lymphatic glands were removed from below the diaphragm. Patient has gained forty-two pounds since the operation, and has as yet apparently no recurrence.

NEPHRECTOMY FOR TUBERCULOSIS.

DR. KAMMERER presented a boy, eleven years of age, from whom he had taken a tubercular kidney. The patient had suf-

ferred from tubercular adenitis for several years. He also has a prominence at the junction of the dorsal with the lumbar vertebræ, due, no doubt, to a former tubercular affection of the bodies of some vertebræ. When first seen, almost a year ago, he had a tumor in right lumbar region, the urine was loaded with pus and tubercle bacilli. Catheterization of the ureters was deemed inadvisable, and the bladder was opened above the symphysis. The latter organ was found extensively diseased, ulcerations appearing in every part almost. Catheters were placed in both ureters for twenty-four hours. The urine from the left kidney was clear, contained no albumen and no tubercle bacilli, whereas the secretion from the right side was full of pus and contained innumerable bacilli. Nephrectomy was done a day or two later, and the patient made a good recovery. The right kidney was extensively disorganized. The ureter was not removed. The wound has completely healed and not reopened since. There still exists a fistula over the symphysis. About two months after operation a large, cold abscess formed in the left iliac region, which had all the appearances of one due to tubercular affection of the vertebral column. It pointed above Poupart's ligament, and was evacuated at that point, the evacuation being followed by an iodoform injection. The speaker thought that the case might be one of those rare secondary infections of the urinary system from pre-vertebral abscess by continuity.

DR. A. B. JOHNSON described the case of a woman who had a tuberculous kidney removed early last spring by another surgeon. Dr. Johnson was present at the operation, and he stated that he was struck at the time by the enormous size of the ureter, which was evidently very extensively diseased. Following the operation, the wound did not entirely heal, a sinus remaining in the loin, although the woman's health improved greatly.

Dr. Johnson said he saw this patient again a few days ago, and although her urine was comparatively clear, she still had the sinus in the loin, which he attributed to the diseased ureter which had been left behind. Upon extirpating the walls of the sinus and exposing the ureter, he was much surprised to find that the ureter had almost completely disappeared, being represented by a thin, fibrous cord containing at intervals three or four beads about the size of buck-shot, which, on incision, gave vent to a yellowish material resembling axle-grease, hardly cheesy in char-

acter. It appeared that the tubercular process in the ureter had practically cured itself.

DR. F. TILDEN BROWN said the remarks made by Dr. Johnson were quite in line with his own experience in a case where he had removed a large tuberculous kidney, leaving the ureter behind. The patient, a small boy, made great improvement after the operation, nearly doubling in weight; but about six or seven months later he died suddenly from a tubercular meningitis. At the autopsy the diseased ureter, which had been left behind, was examined with great care. At the time of operation it was very much enlarged, almost to the size of a man's thumb. When removed, after death, it was found that it had diminished fully one-fifth in size, although tubercle bacilli were still present.

Dr. Brown said he was inclined to believe that when the functional use of the ureter is in abeyance, the chance for its repair is good, if the general condition of the patient is favorable. The speaker asked Dr. Kammerer whether he attributed the disease of the kidney to direct infection from the spondylitis? The appearance of the specimen shown indicated rather that the cortex and parenchyma had been primarily diseased, probably by blood infection.

DR. WILLY MEYER said that in quite a number of cases of tuberculosis of the kidney he had resorted to nephrectomy without removing the diseased ureter, and in not a single instance did a sinus remain in the lumbar region. This had convinced him of the correctness of the view that, when the tuberculous kidney is once removed, the ureter could take care of itself. Of course, there are exceptions to this rule, when the ureter is very much enlarged, etc., but as a general thing, if the uppermost portion of the tube is removed with the kidney, the rest can be safely left behind.

Dr. Meyer said he was rather inclined to doubt the wisdom of doing a suprapubic cystotomy for the purpose of determining which kidney is diseased. In these patients the operation is so apt to leave an obstinate, even permanent, fistula that other methods of diagnosis should first be given a thorough trial. The speaker said he had recently seen a man who was suffering from tuberculosis of the genito-urinary tract of such an advanced type that even one year ago another surgeon had refused to operate. When Dr. Meyer saw him, the man's condition was such that an

operation was imperative. Cystoscopy was not feasible. Suprapubic cystotomy was done in order to treat the tuberculous ulcerations of the bladder, and find out by permanent catheterization for twenty-four hours the working power of the apparently less diseased kidney. Then the suppurating left kidney was removed. The patient has since remarkably improved in his general condition, but the suprapubic fistula still remains open, and has proved very rebellious to treatment: this in part is probably due to the fact that the patient has a complicating tuberculosis of the prostate.

In regard to the wisdom of removing a tuberculous kidney when we know that its mate is not entirely healthy, that can only be decided, during operation, by the state of affairs we have to deal with. If we find the kidney studded with tubercles on its surface and practically useless and a menace to life, it should be removed; by so doing we may even improve the condition of the less diseased kidney. If, on section, the kidney appears to be only partially affected, one has to weigh the pros and cons with reference to resection of the organ.

DR. F. H. MARKOE said he had operated eight or ten times for tuberculosis of the kidney, and had never seen a sinus persist. He referred to one very advanced case, which had come under his observation six years ago. The patient, a woman, was reduced to a skeleton; she had a large nephrotomy wound, and the case had been diagnosticated as one of lumbar abscess. After removal of the tuberculous kidney, the patient rapidly regained her health and has since remained well. The urine still shows evidences of a chronic nephritis of the opposite kidney, together with a tubercular infection of the bladder.

Dr. Markoe said that in none of his cases had he secured the ureter outside of the body. In two instances the operation was done at such a late date that the patients died soon afterwards. In the remaining eight cases the patients improved, and most of them are alive now. The speaker expressed the opinion that even in advanced cases of tuberculosis of the kidney, removal of the kidney was almost imperative, and certainly preferable to nephrotomy. The ureter, when left behind, probably becomes encapsulated and the disease remains latent. He had never seen general dissemination of the disease after the removal of the kidney.

DR. ALEXANDER J. McCOSH said that his experience with leaving the diseased ureter behind was not so fortunate as met with by others who had discussed this question. He had in mind three cases where the ureter was left after excision of a tubercular kidney. In one, where the kidney was excised three years ago, the patient returned two years later with an abscess which had apparently developed near the site of the ureter. After opening and scraping the abscess the wound healed temporarily, but later a second abscess appeared a little lower down. Dr. McCosh said he expected to operate on this patient again, and remove the diseased ureter.

In another case the patient was a woman whose condition was so desperate at the time of operating that the diseased ureter was left behind, although it was much enlarged. A sinus remained, and about a year later he cut down and removed the ureter; it was about as thick as a man's thumb and filled with tuberculous, granulating material. In a third case, a man who was operated on about two years ago and the ureter left behind, a sinus remained: recently, on injecting a solution of methylene blue into this sinus, the patient urinated blue water.

Dr. McCosh said he did not mean to maintain that the ureter should be removed in every case of tuberculosis of the kidney, but in many instances, where it is much enlarged and the patient is in good condition, he certainly thought it wise to remove it, either wholly or in part. The speaker said he had removed the entire ureter in three cases at the time of doing the nephrectomy without unduly prolonging the operation, and it seemed to him that the patients had done better afterwards than in those cases where the ureter had been left behind.

DR. KAMMERER said that, with the exception of one case, which he had operated on eight years ago, he had never seen a fistula remain after a nephrectomy for tuberculosis. In one case he left a ureter as thick as a man's thumb; the wound healed and the patient has remained in perfect health since. The speaker said that, as a rule, we have no further trouble from the ureter, and even tubercular ulcerations about the ureteral orifices heal spontaneously after removal of the kidney which is the source of the trouble, the infection in such cases being a descending one. This fact was illustrated in a case which recently came under his observation. The patient was a woman with a tubercular kidney,

which he removed five months ago; at the time of operation, there were a number of tubercular ulcerations surrounding the ureteral orifice in the bladder which could be easily recognized with the cystoscope. These have since disappeared without any further treatment.

Dr. Kammerer said he did not quite agree with the statement made by Dr. Markoe regarding the futility of doing a nephrotomy in these cases. The speaker said he had found a preliminary nephrotomy very valuable in some instances, as it allowed the condition of the patient to improve, and nephrectomy could then be done with greater safety. He believed this method should be employed in all cases of mixed infection, when constitutional symptoms, due to absorption, were present.

Dr. MARKOE said he did not refer to a preliminary nephrotomy, but to those cases of tuberculosis of the kidney where the operation was intended as a permanent measure of relief. Such patients always do badly and require a subsequent nephrectomy.

Dr. Markoe said that in all his recent operations for tuberculous kidney he has resorted to a modification of the König-Israel incision, passing well forward, and taking away as much of the ureter as possible.

A PRELIMINARY REPORT UPON THE SURGICAL ANATOMY OF THE GALL-BLADDER AND DUCTS, FROM AN ANALYSIS OF ONE HUNDRED DIS- SECTIONS.

Dr. GEORGE E. BREWER read a paper with the above title, for which see page 721.

Dr. MARKOE said he had often in the dissecting-room experienced difficulty in recognizing the papilla which marked the entrance of the common bile-duct into the duodenum. This investigation has shown that an incision made at this point reveals a crescentic fold, and this must form a valuable landmark in finding the duct. Of course, when a calculus is so far down as to project into the duodenal orifice, it is comparatively easy to find it, but when it is located higher up, it is sometimes very difficult to find the orifice.

Dr. WOOLSEY said that about a year ago he had read a

paper before the Surgical Society on abdominal incisions, in which he showed, as the result of numerous dissections, that in operating on this region an oblique incision along the costal margin is an excellent one, as it involves very little damage to the nerve-supply.

DR. ELLSWORTH ELIOT, Jr., after referring to the fact that the relationship of the various organs was materially altered in pathological conditions, said he was much interested in having the point about the papilla brought out, because of its comparative constancy and its value in the performance of operations for calculi impacted in the intestinal end of the common duct. The position and surroundings of the upper part of the common bile-duct are often materially altered in cases where one or more attacks of peritonitis have taken place, resulting in contraction and malposition of the duct, with thickening of the surrounding tissues and obscuration of the field of operation. Dr. Eliot said he had often thought that the lower part of the duct could be most easily and safely reached by making an incision parallel to the outer margin of the second part of the duodenum through the posterior parietal peritoneum rather than by passing directly through the wall of that portion of the gut. In this way the posterior wall of the duodenum is thoroughly exposed outside the peritoneum, and the number of arteries and veins divided is very small. By reflecting the second part of the duodenum towards the median line there would be no difficulty in exposing the lower part of the common bile-duct. This method of procedure might prove difficult, however, in cases where the hepatic flexure of the colon was situated high up.

DR. McCOSH referred to the device of injecting the gall-bladder with water or air in order to learn whether the cystic duct is permeable.

DR. MARKOE said he had on three or four occasions introduced a canula into the gall-bladder, securing it there, and then forced water from the gall-bladder into the intestine in sufficient quantities to prove the patency of the duct.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, March 6, 1899.

The President, J. EWING MEARS, M.D., in the Chair.

PANCREATIC CYST.

DR. THOMAS S K. MORTON reported the following case: A woman, thirty years of age, had noted thirteen months before coming under his observation a swelling in her epigastrium, as a lump behind her stomach, which had arisen after an experience of colicky pains in the epigastrium, with occasional violent exacerbations, making in all a period of two years from the first observation of the pains up to the time of her coming to Philadelphia. Eight months before operation the mass in her epigastrium had become as large as a cocoanut, and she consulted a surgeon in Cleveland, who, finding that it fluctuated, aspirated the fluid, and proved, on analysis, that it changed starch into glucose and emulsified fat. She returned to her home subsequently, and remained comparatively comfortable for a short time, the swelling, of course, having temporarily disappeared. Something over a pint of fluid was withdrawn. It was colorless and watery and had the chemical properties before mentioned. Recurrence of swelling, however, promptly came about, with an amplification of her former colicky pains. Occasionally she had an exacerbation, which amounted to agony. This history made diagnosis easy. The tumor presented immediately beneath the ensiform cartilage and apparently displaced the stomach and colon downward. A small median incision, not more than an inch and a half, was made in the epigastrium. The tumor, which then was the size of a canteloupe, was opened and the edges of the sac were united with the skin of the abdominal wall. About three pints of fluid were withdrawn, having the same properties

as the fluid first drawn from the cyst,—namely, that it was of neutral reaction, colorless, watery, not thick, emulsified fat to a slight degree, and to a greater extent converted starch into sugar. There was a moderate discharge of fluid from the sac for several days subsequently. The method of draining was a large rubber tube, which was in turn surrounded by a spirally wrapped rope of iodoform gauze. No hardening or other trouble with the pancreas could be detected. On the fourth day the gauze wicking was withdrawn, and at the end of ten days the tube was left out. She returned to her home three weeks after the operation. The sinus continued to discharge for two months more, when it closed spontaneously. She has been perfectly well ever since, now a period of nineteen months.

MOVABLE KIDNEY.

DR. JOHN B. DEEVER read a paper with the above title, for which see page 706.

DR. HARTE referred to the practice of Mr. Morris, who was very strongly in favor of using the suture for fixing the kidney in the loin. Regarding the operation described by Dr. Deaver, the speaker had a number of times done practically the same operation, varying slightly in details only. The operation was not original with Dr. Senn, but had been taken from the German. He had followed up these cases, and he agreed with Dr. Deaver that it is the most satisfactory means we have of fixing the kidney in its normal place. He had tried suturing, and did not think that to be a rational operation, because it exposes the kidney to certain dangers. If the operation under discussion is done in a half-hearted sort of way one is bound to have a failure, just as in a hernia operation; but if one cleans out all the perirenal fat, getting good fresh surfaces in the kidney and loin, and then incises the surface of the kidney—the capsule—so that in the course of forty-eight hours a certain number of granulations will start up, and then does the same thing with the posterior wall of the loin, the surgeon will surely have a condition in which the kidney is moored firmly in position. He had followed up the cases that he had done, and his results had been satisfactory. He thought this to be the most rational operation of fixing the kidney.

DR. TAYLOR said that in many cases that he had seen, where the kidneys had been sutured in place, there had been a persistent

pain for a number of weeks, sometimes for months, a presumable pinching of a nerve. He inquired whether in the cases that Dr. Deaver had had he had ever met that condition.

DR. J. CHALMERS DA COSTA said that a clearer distinction should be made between the two sorts of movable kidney. The mere fact that a kidney is movable should not be considered as ample justification for interference, and yet he thought the idea had gone abroad that, if a movable kidney is found in an individual, some sort of an operation must be done. On several occasions he operated in individuals who had been very neurasthenic, and at the same time suffered from a slight degree of movable kidney. It is not to be conceived that mere fixation of a kidney is going to benefit neurasthenia. The fact that a normal kidney is movable to a certain degree is generally recognized, and the question should be, Is this movability sufficient either to endanger the functions of the kidney or interfere greatly with health or with the comfort of the individual?

In regard to the operation of suture, he had been much dissatisfied with it. He had tried several methods, but had been so dissatisfied in anchoring the kidney by sutures that he had not resorted to it in the past year. He had heard Watson Cheyne say that one may anchor kidneys ever so carefully, but they are apt to get loose again. He had read articles in which it was said that the kidney does not get loose, but whenever he talked to individual operators he found that a very considerable percentage of kidneys do get loose.

DR. T. S. K. MORTON said that until surgeons learn something more in the way of treating another condition of which "loose" kidney is usually but one part, they will not get uniform results from any operation on the displaced kidney. The contributions to literature during the last two or three years have shown pretty clearly that "loose" kidneys, as a rule, are simply a part of a more or less general loosening of the abdominal organs (ptosis), and that while a certain proportion would be benefited by anchoring the kidney, the signs and symptoms springing from a disordered position of the abdominal viscera not rarely recur after the rest-cure involved in the after-treatment incident to anchoring of the kidney has lost its temporary beneficial effect. In the treatment of this ptosis of the abdominal viscera will be

found the secret, if there is any, for the getting of uniformly good results in floating kidney.

DR. DEEVER, in answer to Dr. Taylor's question, replied that, with one exception among twelve or fifteen of these operations, he had never seen pain except as the result of dressing the wound. This pain is but temporary, and it so happened in that case he had tried to hasten the process; for two or three days the girl had some pain with a little elevation of temperature. He naturally thought there was a focus of suppuration, but, upon examination of the wound, could not find any. At the end of two or three days the temperature reached normal, and the patient ceased to have pain.

The pain to which Dr. Taylor referred he believed to be due to traumatic neuritis consequent upon injury of nerves at time of operation. In the dissection for the exposure of the kidney he was careful to avoid nerve injury.

Relative to Dr. Da Costa's remark, he had avoided speaking of the different varieties of movable kidney, because he had not wanted to make a distinction between floating kidney and movable kidney, as he thought that the fewer terms were used the more practical the subject would be made. He specifically stated in his paper that movable kidney, which causes symptoms of acute abdominal pain, rigidity of the overlying abdominal muscles, etc., were the only cases in which he advised operation.

He had also borne in mind the likelihood of general dropping of the viscera. He had invariably examined his patients for this condition.

CARCINOMA OF THE FUNDUS UTERI.

DR. CHARLES B. PENROSE read a paper with the above title, for which see page 741.

OPERATIONS FOR HARELIP.

DR. J. EWING MEARS presented a series of photographs (Figs. 1, 2, and 3) showing double harelip, with protrusion of the intermaxillary bone, occurring in a lad of eight years of age, and also the results obtained by operation. In this case he removed a small wedge-shaped piece from the posterior surface of the protruding intermaxillary bone, and forced the bone back into

position in the cleft which existed in the alveolar process, having previously freshened the edges of the bone and of the process. He then wired the bone in position and completed the operation by closing the double cleft in the lip.

He called attention to the method of operation which avoids excision of the protruding intermaxillary bone. Excision of the bone was recommended by Sir Wm. Ferguson and practised by



FIG. 1.—Showing double harelip, with protrusion of the intermaxillary bone. Front view.

him in his operations, the reason being given for this method that the incisor teeth will grow backward into the mouth, and thus prove a source of annoyance. In the cases which have come under his observation he had not found this to be the fact, and, further, he had gained what he considered decided advantages in perfecting the operation upon the lip as well as upon the hard palate, which is involved in these cases. If the projecting intermaxillary bone is rudimentary, of course it is desirable to remove it.



Fig. 2.—Showing side of the same case.

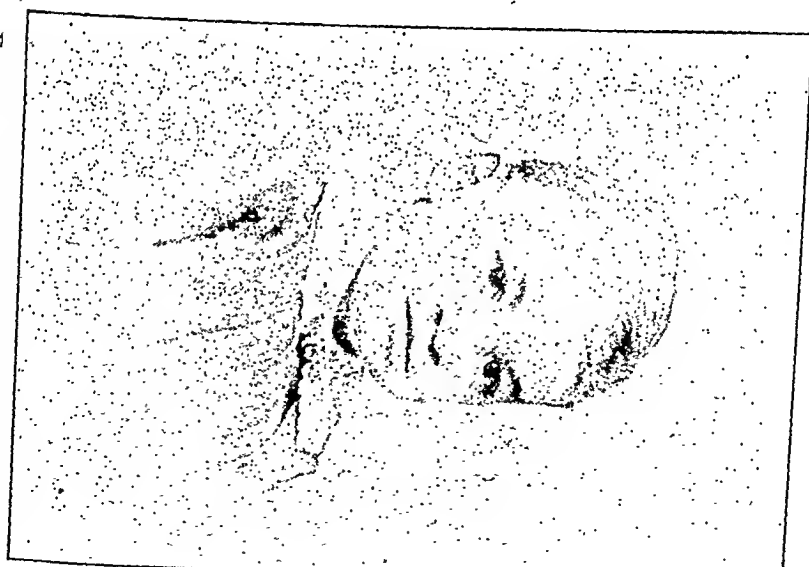


Fig. 3.—Showing ultimate results after operation.

Several cases had been sent to him for operation upon the palate in which the protruding intermaxillary bone had been removed. He had observed, in these cases, a failure to secure as good results in repair of the cleft of the lip as when the bone is permitted to remain in position, and he had also encountered difficulties in obtaining closure of the cleft in the hard palate by reason of the absence of the bone.

DR. WHARTON said that he had formerly employed the method of excising the maxillary bone, but recently had given it up. He had found that it left a very large gap and made it difficult to close the palate, and closure of the lip is interfered with. In cases which had come under his care recently, he had freshened the edges of the intermaxillary bone and that of the alveolus, and wired them. In some cases the intermaxillary bone is broken, in others he divided it partially with an osteotome, and then bent it into place. He had generally succeeded in wiring the intermaxillary bone in a fair position, with the result that the deformity of the lip was much improved. He thought that when these cases come to operation for cleft palate, it will be found that the correction of the deformity is very much improved by this procedure.

EDITORIAL ARTICLE.

RESULTS OF STOMACH OPERATIONS AT THE HEIDELBERG CLINIC.¹

DR. STEUBEL presents a full report of the operations on the stomach which have been done in the clinic of Czerny, at Heidelberg, during the thirty-four months ending January, 1898, to which is added accounts of the final results of earlier cases already reported. The more recent period includes ninety-four operations,—viz., eight pylorectomies, four pyloroplasties, sixty-five gastro-enterostomies, four gastrostomies, one gastrorrhaphy, and twelve exploratory laparotomies for gastric disease. The earlier period, beginning in 1881, comprised ninety-eight operations, including eighteen explorations. The total number, therefore, of operations to the close of 1897 is 192.

Pylorectomy.—Eight recent cases,—carcinoma seven, sarcoma one. Three died as a direct result of the operation, and three—four, six, and eleven months respectively—after operation. The last two cases are still alive (nine months). Kocher's method—suture of the stomach and implantation of the duodenum in the posterior wall—was performed four times. In three cases a posterior gastro-enterostomy with the Murphy button was first done, and then followed resection of the pylorus, closing the free ends of the stomach and duodenum,—the operation was done once in two stages. In the remaining cases, pylorectomy and closure of the free ends was first accomplished and then an anterior gastro-enterostomy with the Murphy button performed. No one method seems to present any special advantages, although the

¹ Beiträge zur klinischen Chirurgie, Band xxiii, Hefte 1 und 2.

saving of some fifteen minutes' time attending the use of the Murphy button is not to be undervalued. There is a feeling of marked security in beginning by performing a posterior gastro-enterostomy, as the pylorotomy may then be abandoned, if necessary, or if it be found advantageous to reserve its performance for another sitting. It is only necessary to locate the opening at a proper distance from the pylorus, a rule that holds good in general for the performance of gastro-enterostomy for malignant disease. If the button is used, there will be no danger of tearing apart the edges of the new opening. Posterior gastro-enterostomy with the Murphy button, followed by pylorotomy, is the quickest operation and attended with the least technical difficulties. Kocher's operation is very difficult, owing to the depth of the wound one has to work in, but it seems to promise the best functional results, as it more nearly complies with the normal conditions. The three cases that lived made an extremely smooth convalescence. Czerny has not always been able to carry out his proposed plan of doing his pylorotomies hereafter in two sittings, beginning with the gastro-enterostomy. When this plan is put into effect, an interval of at least three weeks should intervene; but, on the other hand, one cannot afford to let a malignant tumor grow too long. The second operation is rendered more difficult, owing to adhesions, and whenever possible the entire procedure is best completed in one sitting.

Counting in the old cases, the record of the clinic is twenty-four pylorotomies for carcinoma and sarcoma. Nine died as a direct sequel of the operation. In others life was prolonged—three months one, seven months four, and for nine, ten, eleven, fifteen, twenty, and thirty-one months each one case. Four are living, nine and eleven months, three and one-half and seven years after operation. The operation was also performed five times for non-malignant stricture; one case has remained well now fifteen years. Since October, 1889, the operation for this class of cases has been replaced by pyloroplasty or gastro-enterostomy. The average

duration of life in the twenty-four operations for malignant diseases is eleven months: excluding the cases dying as a direct result of operation, the prolongation of life averages twenty-two months. There is, however, a direct operative mortality of 37 per cent.

The proportion of pylorectomies performed has increased steadily, though, perhaps, not to that extent that operations on the stomach have increased in the clinic,—1891-1892,—eleven operations; in the last five years thirteen. The mortality has, however, not diminished, as for the two periods mentioned it was respectively 36.4 and 38.5. In estimating the probabilities of lessening the death-rate and of obtaining more permanent cures one must believe that the surgeon's resources are practically exhausted, and the problem must be solved by medical men in making earlier diagnoses and supplying a less exhausted class of subjects for operation.

Pyloroplasty.—Four recent cases. There was no mortality. In one case the stricture was first discovered to be malignant on microscopical examination of a removed portion. The patient recovered well, gained forty-two pounds, and refused resection of the pylorus. Nine months later gastro-enterostomy by von Hacker's method was necessary, and again, eight months later, this time by Wölfler's method. In another case symptoms of stenosis recurred in three months.

The sum total of pyloroplasties is eleven,—one death. In only two cases can the result be pronounced good; in these it was due as much to the removal of exciting causes. Several of the other cases required or should have had further operations. On account of its unsatisfactory permanent results it has been abandoned since January, 1896, for gastro-enterostomy. Formerly preference was given to pyloroplasty, on account of a lesser mortality, due to the greater simplicity of the operation, and the restoration of anatomical conditions more nearly resembling the normal. To-day these advantages no longer exist, as the tech-

nique of gastro-enterostomy with the Murphy button is simpler and quicker, and we know that the advantage of the restoration of normal conditions is more apparent than real.

Gastro-Enterostomy.—Sixty-five recent cases. The operation was performed forty-seven times for malignant disease, fifteen times for non-malignant stricture, and three times for simple fresh ulcer. There were twenty deaths (within the first thirty days),—30.8 per cent.; in malignant disease, 38.3 per cent.; in other conditions 11 per cent. As a cause of death, pneumonia is greatly in evidence, occurring fifteen times, a proportion differing widely from the experience of other operators. The frequency cannot be ascribed to the anæsthetic,—ether was rarely used,—and in five cases operated under local anæsthesia, two developed pneumonia. The season of the year can also not apparently be held responsible. Most of these patients will be found to present some pulmonary disturbances, such as bronchitis, emphysema, etc., conditions which are easily aggravated by an anæsthetic, recumbent posture, and compression by the abdominal dressing. Moreover, the epigastric incision increases the difficulty, interfering with respiration more than does the subumbilical. It is noteworthy that relatively more men die from pneumonia, as in the male, the breathing being essentially of the abdominal type, the embarrassment is greatest. It is doubtful if letting the patients up at an early period, as practised in some clinics, prevents the pneumonic process, as its onset generally occurs in the forty-eight hours following operation.

Only one case died of regurgitation of intestinal contents, and here the conditions were complicated by a free hæmorrhage from the ulcerating carcinoma. Among these sixty-five cases, a secondary anastomosis (good result) was only performed once. In the experience of this clinic it never seemed in order to combine the gastro-enterostomy with a primary entero-anastomosis. The infrequency of regurgitation is probably due to the employment, whenever possible, of von Hacker's operation, care being

taken, in making the attachment of the jejunum, not to subject it to any tension, and that the peristaltic harmony of direction was maintained. Another element favoring the prevention of regurgitation is to be found in the use of the Murphy button, which certainly, at first, precludes the formation of a spur. Twelve of the anastomoses were made with sutures, the rest with the button, which since 1896 has been employed exclusively. It is of immense advantage in malignant disease in diminishing the duration of operation and allowing of early nourishment. On several occasions the button was supposed not to have been passed, but could not be found on reopening the abdomen or at autopsy. Although, in a considerable number of cases, it was plainly evident that the button had not escaped, yet in no instance did its continued presence do any damage. Since the use of the button has become established technical difficulties attending the operation have disappeared. There was never any trouble in bringing the two halves together.

The results of treatment of fresh round ulcer, characterized by severe hæmorrhage, were most gratifying, and it would appear that the affection is manifestly benefited by this operation, and that, as a rule, all symptoms are relieved. (The experience of others also confirms this view.) Owing to the unobstructed escape of gastric contents hyperacidity is impossible, and the exciting cause disappears. From a practical stand-point, then, one should not waste much time in looking for an ulcer, as gastro-enterostomy with its much simpler technique better accomplishes the purpose than does an excision of the ulcer.

Counting previous cases, the total number of gastro-enterostomies is 110, with thirty-three deaths, or 30 per cent. mortality; eighty-two were for malignant disease, with twenty-nine deaths, 34.5 per cent.; non-malignant, twenty-eight, with four deaths, or 14.3 per cent. These figures show better results than given in Chlumsky's large statistics, where the figures stand as 38.5 per cent. to 21.4 per cent.

The field of gastro-enterostomy has been extended by its substitution for resection of non-malignant stricture, and by its recent application for the relief of simple fresh ulcer. The operation is now more frequently performed, owing to its improved technique, especially in the saving of time with the use of the Murphy button. The mortality with the button, 24.5 per cent., compares favorably with the 36.8 per cent. of the suture method.

Von Hacker's method was employed ninety-six times; Wölfler's, fourteen times; but a comparison of their results would not be just, as the latter operation was employed only in severer cases, when the former was not possible.

The duration of life after gastro-enterostomy for cancer averaged 12.6 months. Some patients are alive as long as four and one-half, five, and five and one-half years. Subtracting, however, four cases of prolongation of life incompatible with the diagnosis, the average is 7.8 months.

Of the twenty-eight anastomoses for non-malignant conditions, twenty-three are still living. The gain in weight of these individuals ranges from eighteen to forty-five pounds. The dilatation of the stomach had usually not quite disappeared when re-examined. The motor function was good, in fact, the stomach was usually found to have emptied itself quicker than normally. The total acidity, as well as the free hydrochloric acidity, was constantly under the normal; indeed, the hydrochloric acid was for the most part absent.

Comparisons of the permanent qualities of the openings made with the Murphy button or by suture in non-malignant cases are not yet in order, but it is already evident that, in some cases, the use of the button is followed by a considerable degree of contraction.

Exploratory Laparotomies.—Twelve recent cases,—including all cases,—twenty-eight. Of these twenty-four were for carcinoma, with a mortality of 25 per cent.: these figures are high; but the class of cases was in the main the worst. Duration of life, after operation, was usually less than five months.

Miscellaneous Operations.—Gastrorrhaphy for traumatic rupture; one, fatal. Two cases of ulcer of the stomach, in one, the operative measures *per se* appeared to have a beneficial effect. In another case the edges of the ulcer were excised and the base cauterized: the subsequent result was unsatisfactory.

The accompanying table conveys an idea of the total number of stomach operations done in Czerny's clinic. The figures in parenthesis represent the fatal cases,—that is, those dying within thirty days after operation. The mortality is, perhaps, an unfair measure of the operative success as within the period of time chosen, many deaths may well have been due to the pathological conditions, and not to the operative intervention. The standard is made, however, in accordance with that chosen by Chlumsky.

OPERATIONS ON THE STOMACH IN CZERNY'S CLINIC TO 1898.
(Gastrostomies are not included.)

Years.	Pylorotomy.	Gastro-Enterostomy.	Pyloroplasty.	Exploratory Laparotomy.	Miscellaneous.	Total	Mortality.
1881-89	13 (5)	14 (9)	. . .	11 (2)	4 (2)	42 (19)	45%
1890-93	7 (3)	17 (2)	3	5 (1)	2	34 (6)	18%
1894-95	2	23 (8)	7 (1)	8 (2)	4 (1)	44 (12)	27%
1896	4 (2)	28 (10)	1	2	. . .	35 (12)	34%
1897	3 (1)	28 (4)	. . .	4 (1)	2	37 (6)	16%
1881-97	29 (11)	110 (33)	11 (1)	30 (6)	12 (3)	192 (55)	29%
Mortality	38%	30%	9%	25%	25%	29%	

The table shows the increasing proportion of stomach operations in Czerny's clinic. In the first nine years about the same number was performed as in the next four, or in the next following two, 1894 and 1895, or in each of the last two years. The initial mortality of 45 per cent. has fallen to 16 per cent. in 1897. In the intervening periods the mortality was largely influenced by the great frequency of pneumonia during that time.

The increase in the different varieties of operation differs greatly, the proportion of gastro-enterostomies being the most

considerable. Pylorectomy is relatively less common, as originally this operation was applied to non-malignant strictures, while the number of cases of malignant disease has as yet to be increased by the making of earlier diagnoses. Bad permanent results have led to the giving up of pyloroplasty since 1896. Likewise purely exploratory operations are less frequent, as of late the use of the Murphy button has greatly increased the indications for the performance of gastro-enterostomy.

Of 173 operations for malignant disease fifty-one died,—mortality 29.5 per cent. There were 55.5 per cent. of the male sex. The mortality for the men was 30.2 per cent.; for the women, 28.6 per cent.

CHARLES L. GIBSON.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

I. The Etiology of Cancer. By DR. HEKTOEN. What the nature of the irritant may be that causes the localized overgrowth of epithelial cells which we call cancer, surgeons are yet no nearer knowing than they were before the demonstration of its exact pathology, more than half a century ago. Notwithstanding all the claims that have been made of the causal influence of external biologic factors, parasites from bacteria, fungi, schizomycetes, and blastomycetes to various forms of animal parasites, gregarines and protozoa generally, the solution of the problem is no nearer than before.

Of late the subject has been approached from the other side, the essential vitality of epithelial cells and their reaction to various irritants, and some most interesting results have been obtained by various observers. In Dr. Hektoen's review of this subject we find some striking observations on the subject collated. Ljunggren, a Scandinavian physician, for instance, found to his surprise that he could preserve carefully sterilized bits of human skin in sterile human ascitic fluid for months, and that the cells of the tissues retained their vitality. Three months after their removal from the body the cells of the deeper layers showed well-stained nuclei, and good protoplasmic structure. Successful transplantation was made with pieces kept in such sterile fluid for a month. Small pieces of the transplanted skin were removed at varying intervals, and it was found that a marked proliferation of epithelial cells showing many nuclear figures had occurred. Special precautions were taken, which absolutely assured the absence of cells that might have grown in from the surrounding cutaneous

margin, and so vitiated the conclusions. The transplanted cells not only grew over the raw surface, but penetrated, also, into the granulation tissue beneath, after the manner of a beginning carcinomatous growth.

Almost more interesting and suggestive than this are the observations made by Loeb on epithelial regeneration. This observer saw "from the margin of a tissue-defect huge epithelial protoplasmic or plasmodial masses move in a sliding manner over the naked surface, inclosing and dissolving the crust and other obstacles. Regenerating epithelium readily removes such substances as cartilage when placed in its way. Below the protoplasmic layer epithelial cells wander in from the margins of the defect, and often grow down into the connective tissue, apparently checking the growth of the latter. The process is closely allied to changes in carcinoma. At the same time active changes, such as mitoses, occur in the epithelial cells removed some distance from the margins of the wound. . . . Loeb believes that the wandering of the cells, as outlined, is in response to stereotropism, and forms a determining factor in inducing mitosis in the remaining cells." The pregnant significance of these observations, especially the apparent action at a distance of epithelial elements in arousing epithelial cells into reproductive and germinal activity, can scarcely be over-estimated. This is the essence of carcinoma, though in healthy subjects the vital resistance may be sufficient to restrain the morbid overgrowth that would otherwise result.

According to Loeb, "if a small bit of epithelium is placed in the centre of the crust covering a defect in the skin, it begins to send out processes in all directions into the crust, the cells acting as separate organisms, independent of blood-supply or nervous influence." We are evidently closely in touch, in these manifestations, with the as yet inexplicable vital forces that we see at work in all their untrammelled energy and power in cancer. Further observations are needed to give the deductions from

these observations practical application. They constitute, however, the most hopeful aspect of the present pathological work on cancer as far as regards the near prospect of discovering its etiology. Their value as additions to biological science, especially to that mysterious problem, the struggle for life among the various cells of the body tissues, can scarcely be over-estimated.—*Progressive Medicine*, March, 1899.

II. Solutions for Local Anæsthesia. By DR. HEINZE. The author, as a result of many experiments, finds that endermic injections of distilled water cause much pain and a tender infiltration, which may persist for days; that such injections of 0.8 per cent. solution of common salt are painless, and produce a wheal which disappears with rapidity. Cocaine is the most powerful and least irritating local anæsthetic, eucaïne B being the only material which approaches it in value. The eucaïne B, however, may be boiled as often as desired without undergoing decomposition, and in this respect is preferable to cocaine. The author recommends the following solution for local anæsthesia:

Eucaïne B	0.1;
Common salt	0.8;
Water	100.

In this the eucaïne alone is the anæsthetic, the salt is only used to prevent the water from causing any trouble.—*Virchow's Archiv*, Band cliii, p. 466.

JOHN F. BINNIE (Kansas City).

HEAD AND NECK.

I. Metapneumonic Thyroiditis. By DR. B. HONSELL (Tübingen). The affection is infrequent, and until lately no bacteriological confirmation of the diagnosis existed. In 1897 a case was observed in the Tübingen clinic.

Woman, aged twenty-nine years; goitre of ten years' standing. Following closely on a croupous pneumonia of the right

lower lobe a swelling of the thyroid appeared; at first it remained nearly stationary, but increased in size after six to eight weeks. No marked elevation of temperature. Incision evacuates a considerable amount of pus. Cure. Examination of the pus shows numerous pneumococci yielding a pure culture.

In most of the recorded cases the infection seems plainly to have been carried by the blood-current. Some cases, however, fail to give a history of an antecedent pneumonia. The thyroid may or may not be the seat of morbid changes before being infected.

The course of these metapneumonic thyroidites is generally favorable, threatening symptoms seen in some varieties of inflammation not occurring, and incision being followed by a prompt healing. Such a favorable course can probably be ascribed to the well-known tendency of the pneumococcus to diminish rapidly in virulence. The condition described is one of the rarest complications of a croupous pneumonia, and further instances should be carefully studied.—*Beiträge zur klinischen Chirurgie*, Band xx, Heft 3.

GENITO-URINARY ORGANS.

I. Hernia (Inguinal) of the Bladder. By DR. G. LOTHEISSEN (Innsbruck). The writer has put on record seven cases of hernia of the bladder, observed in the Innsbruck clinic. A review of the literature brings the total number of recorded cases to 144.

Inguinal cystocele occurs more frequently than the femoral variety, the proportions tallying fairly accurately with the relative frequency of the two forms of hernia.

It is impossible to state definitely how often a hernia of the bladder occurs. It is quite certain that familiarity with its possible occurrence and the modern operations for hernia involving more extensive dissections reveal its presence now to a greater extent than formerly.

This condition is seen most frequently between thirty and sixty years of age. The inguinal cystocele follows quite closely the usual distribution of that variety between the two sexes,—that is, for ten men with inguinal hernia there is one female so affected. It occurs about as frequently on one side as on the other.

Intraperitoneal cystocele and the combined form (intra- and extraperitoneal) always descend as indirect herniæ, while the extraperitoneal form is observed to be internal to the epigastric vessels. In the literature more than two-thirds of the cases are described as extraperitoneal; but a careful study of the anatomical conditions, especially of the relation of the epigastric vessels to the hernia, will probably show that more and possibly most cases are of the combined type.

The herniated portion of the viscus is usually small, seldom exceeding the size of an English walnut. As a rule, the accompanying hernia is not of an unusual size.

So far as known, there is no clear record of a congenital hernia of the bladder. The various factors alleged to have an influence in its production as an acquired lesion do not seem to be very obvious,—*e.g.*, enlargement of the prostate, lithiasis, pregnancy, etc. Of the anatomical causes, the most frequent must be the descent of a portion of the prevesical fat, which later drags down the bladder with it.

While the majority of the cystoceles give rise to no symptoms, they occasionally present a very characteristic picture. Marked disturbances of micturition are present; at times spontaneous evacuation is impossible, the bladder being squeezed by the action of the abdominal muscles. The patients have sometimes to resort to unusual positions during the attempt at urinating, dorsal decubitus being the most effectual. The most characteristic sign is the presence of a tumor in the inguinal region, varying in size according as the bladder is full or not. The evacuation of urine may often be effected by pressure on this tumor from without.

The surest way of recognizing the bladder is by a careful exposure of the parts, best obtained by such methods of operating as involve the splitting of the fascia of the external oblique. If a tongue-shaped mass of fat, with its base towards the epigastric vessels, is seen internal to and below the sac, one should be on the lookout for a cystocele of the combined form. Some authors describe this prevesical lipocoele as being of a different color; it is, however, not so, though it is less dense in consistency than the ordinary subcutaneous fat. Incision of the sac should be along its outer edge.

As greater familiarity with the subject is acquired, lesions of the bladder are less frequent, the condition being now more readily recognized. Should the bladder have become damaged by strangulation, it is probably wisest not to proceed to immediate resection, but rather to await the definite limitation of the gangrene. If dealing with an intraperitoneal or combined cystocele, the peritoneum below should be incised and the bladder drawn through it, and sutured so that the lesion becomes extraperitoneal. Most operators at the present time will prefer to leave the wound open after suture of the bladder, or close it so soon as the state of the bladder wound seems to allow it. Fine fistulæ will generally heal spontaneously. As a rule, the catheter *à demeure* is not called for.—*Beiträge zur klinischen Chirurgie*, Band xx, Heft 3.

C. L. GIBSON (New York).

II. Operative Treatment of Glandular Hypospadias.

By PROFESSOR VON HACKER (Innsbruck).—The operation recommended by von Hacker differs considerably from the ordinary methods. The urethral orifice, together with its corpus spongiosum, is freed from its surroundings, the dissection being carried well backward. The glans is tunnelled through, and the urethra is pulled forward, and the meatus is sewn to the external surface. The advantages claimed for the operation are:

(1) It does away with the necessity of operating in several sittings.

(2) It ensures greater certainty of union, other methods frequently requiring repetition of the operation and secondary measures for closure of fistulæ.

(3) As there is an absence of any canal requiring to be covered over, a catheter *à demeure* is unnecessary. No subsequent constriction of the opening is to be apprehended.

(4) The urethra remains surrounded by its corpus cavernosum, and the new external orifice by erectile tissue in a nearly normal fashion,—the latter circumstance being highly desirable for the proper ejaculation of semen.—*Beiträge zur klinischen Chirurgie*, Band xxii, Heft 1.

EXTREMITIES.

I. The Results of von Bruns' Subperiosteal Amputation of the Leg. By DR. OTTO HAHN (Tübingen). In 1893, Professor von Bruns published an account of his method, which had been employed in twenty cases. At present the total has risen to eighty-one, a sufficient number to draw definite conclusions as to the value of the operation.

A desirable method of amputation of the leg should fulfil the following conditions: It should be easily performed, and the conditions attending wound-healing should be of the simplest kind; it must do away with gangrene of the flaps, and, lastly, should give a perfectly shaped stump. All these requirements are fulfilled in von Bruns's operation.

The skin being well retracted by an assistant, a circular incision involving *all* the soft parts is carried down to the bone. Two vertical incisions are now made at right angles to the first for about four centimetres, one along the inner border of the tibia down to the bone, the other penetrates between the muscles down to the fibula. Through these incisions the soft parts, including the periosteum, are raised from the bones. The entire mass of

soft parts being properly retracted, the bones are sawn through. There remain then anterior and posterior flaps of periosteum, muscles, and skin. After ligation of the vessels and trimming of the tendons, the periosteal-muscular portion is united over the bones with buried catgut sutures, the skin is united separately after somewhat rounding off the corners. Above the lower third or where the condition of the soft parts demands it, the circular incision through the skin is made separately and at a somewhat lower level.

Of the eighty-one cases, sixty-three were in the lower third, twelve in the middle. There were no deaths. Perfect union was obtained in sixty-two, slight disturbances occurred in eleven, supuration and healing by granulation eight times, two requiring reamputation. In only three cases was there gangrene of the flaps,—less than 4 per cent. Each of these cases was attended with conditions specially predisposing to gangrene. In 1882-88 the amputations in this clinic were attended with a percentage of gangrene of 17. Some collections of statistics give as high as one-third of the cases as resulting in gangrene of the flaps.

The after-results as regard shape and usefulness of the stump were most satisfactory. In no instance was the scar adherent; equally good results attending the complicated and unfavorable as the good cases.—*Beiträge zur klinischen Chirurgie*, Band xxii, Heft 2.

CHARLES L. GIBSON (New York).

REVIEWS OF BOOKS.

LES HYDROCÉPHALIES. Par LÉON D'ASTROS, Médecin des Hôpitaux de Marseilles, et cætera. Paris: G. Steinheil, 1898.

Dr. d'Astros has collected into a volume, under the above title, the results of his personal studies supplementing the investigations of a number of well-known authorities, and has succeeded in producing a work of great interest to the average reader, as well as of value to the specialist. The plural title is noteworthy as indicating the author's stand, he insisting on hydrocephalus as the outward and visible sign of a variety of intracranial causes. While recognizing two classes,—the internal or ventricular, and the external, or supra-arachnoid, the former plentiful, the latter infrequent,—he points out the fallacy of regarding the position of the fluid, which may be ventricular in origin, and still, from the destruction of brain tissue, external in position, as indicative of its source. He does not regard œdematous infiltration as hydrocephalus, but classes hæmorrhagic effusion under that title.

Writing on symptomatology, he urges that the cerebral changes due to retarded development are accountable for a number of symptoms wrongfully attributed to pressure. Attention is called to the disproportionate loss in both size and number of white fibres over the gray matter, the corpus callosum suffering most often.

In the chapter on the hydrocephalic skull a most unusual case is cited, in which the circumference eventually reached eighty-eight centimetres! Fifty-six centimetres may be considered generous measure for a normal adult skull. In this case the external auditory meatus extended almost vertically upward, and attention is called to this change of direction as pretty constant

in hydrocephalic skulls. The change in the various diameters of the head, the enlargement of the orbital arch, the triangular shape of the face, and the rounding out of the calvarium, whereby the frontal and parietal bosses lose their prominence, are brought out. As an aid in early diagnosis Dr. d'Astros calls attention to the cerebral index,—the ratio of the transverse to the longitudinal axis of the skull,—regarding the average as represented by the decimal 77.75. An increase in the transverse will, of course, increase this figure, and as that diameter is regularly lengthened in hydrocephalus, the index will reach ninety-seven or more in typical cases.

Under cures, two accidental recoveries are detailed, one from fracture of the frontal bone following a kick, the other from the penetration of a nail into the upper one-third of the lambdoid suture, left side. Free escape of serum continued for several days, and complete recovery resulted. Apart from a very few well-authenticated cases, like the preceding, while admitting the possibility, he denies the likelihood of complete cure of hydrocephalus.

Chapters are devoted to the discussion of the acute and chronic forms; pathology; degeneration; infection; the differentiation from rhachitic deformities of the skull; tuberculosis; hereditary syphilis; and so on.

Under treatment, the author reviews the various surgical means,—direct ventricular puncture, lumbar puncture, trephining, continuous drainage, and craniectomy. The last two are condemned as dangerous. Of the two forms of puncture, after a careful review of each, the writer tends to throw the weight of his authority towards the ventricular, because of the occasional lack of communication through the fourth ventricle. A plea for careful and intelligent medication, coupled with well-considered educational and hygienic surroundings, completes this scholarly volume.

HENRY GOODWIN WEBSTER.

CHIRURGIE DE L'INTESTINE. Par M. JEANNEL, Professeur de Clinique Chirurgicale à la Faculté de Médecine de Toulouse. Paris: Institut de Bibliographie scientifique, 1898.

There are presented in this brief compendium the operative procedures peculiar to the intestine only, rectum and anus, as well as stomach, being left for other writers. The varieties of fistula, however,—intestino-vaginal, uterine, and vesical,—are carefully considered. The book comprises four sections, treating respectively of general technique; of the small intestine; of the ileo-cæcal region; and of the colon.

A particularly interesting chapter traces the various forms of intestinal suture from the early part of the eighteenth century down. A table gives at a glance the peculiar characteristics of some twenty-five or thirty different methods with their applications, and the names of those who devised and adapted them.

Commenting on post-operative treatment for patients recovering from all forms of intestinal surgery, the author urges *early* evacuation of the bowel, contending that, while the peristalsis has a tendency to destroy adhesions, provided the sutures have been properly applied, such action is far preferable to permitting an accumulation of gas and fæces with the possibility of intestinal paresis.

Intestinal puncture is the first of the operative procedures to receive mention, and is, on the whole, discouraged. And here it may be of interest to note that, although Professor Jeannel has merely collected into one volume most of the operations on the intestine, and lays no claim to originality in this work, he rightly reserves the privilege of commenting on such as have come under his personal experience.

Writing on lateral enterorrhaphy, the author decries the flushing out of the general peritoneum as a step in the treatment of punctures with more or less circumscribed inflammatory surroundings. In this, and in the succeeding chapters on enterostomy, enterectomy, entero-anastomosis, and so on, it is of no

small interest to trace the development chronologically, and to observe what an impetus has been given to intestinal surgery, and how the almost impossible procedures of the older experimenters have been successfully revived and modified since the introduction of asepsis. The disproportion of operators before and after the year 1880 is striking.

The section on the treatment of the appendix, one of prime interest to American readers, is a little disappointing in its brevity. A number of important methods, such as the purse-string suture, resection by the cautery knife, and disinfection with carbolic acid, fail of mention. McBurney's intermuscular incision, too, is not described, nor does the author sufficiently emphasize the importance of separate suture for the mesoappendix.

The volume which Professor Jeannel has submitted fills a distinct need, and is sure to be helpful in that it provides in brief the contents of a vast number of scattered books and monographs, and offers a ready means for comparison and choice of operation. Favorable comment is due upon the clear, systematic arrangement, each subject receiving mention under successive paragraphs as follows: definition, historical note, operative technique, steps in the operation itself, post-operative conditions and sequelæ, and indications. The cuts are all clear and well executed, and are distributed generously throughout the book.

HENRY GOODWIN WEBSTER.

LEITFADEN FÜR DIE CHIRURGISCHE ANATOMIE. VON DR. E.

JUVARA, Subdirector und Assistent am Institut für praktische Anatomie und für Chirurgie, und erster Assistent der chirurgischen Abtheilung im Coltzaspitale zu Bukarest. Large 8vo; 183 illustrations, pp. 291. Berlin: August Hirschwald, 1899.

With the present surfeit of anatomical text-books and of books on operative surgery, the appearance of another volume on surgical anatomy would appear superfluous were it not that

the author had adopted a novel and interesting manner of handling the subject. The plan followed is based on the practice in vogue in the anatomical department of the Faculty of Medicine at Paris (Professor Poirier). This method consists in extending to the students a series of lectures and demonstrations how to expose and recognize regional structures through limited incisions. It stands to reason that, for the appreciation and execution of this practical regional anatomy, a general knowledge of anatomy is requisite, and such is the contention of the author. This work, then, bridges the gap between the text-book on general anatomy and the anatomy as dealt with in books on operative surgery. In this limited sense appears the justification in titling this volume a "guide for surgical anatomy," for, unlike the "Applied Surgical Anatomy" of Treves, it does not take cognizance of anatomy in its relation to surgical exigencies, for it will be frequently noticed that incisions would be of no avail when pathological conditions alter the normal relations.

This book is modelled after a French publication of earlier date, edited jointly with Friteau. In its present form it is much enlarged, and contains 183 illustrations, for the most part original and well executed.

The arrangement of the subject, as aforementioned, is regional, and by far the greatest attention has been given to the extremities. Each region is introduced with a topographical description of what may be appreciated by "digital examination." Then follows a short account of important structures encompassed by the landmarks, and a brief narrative of the relations of vessels, nerves, and viscera; finally are given the directions for exposing any one structure or those that enter into a region. In our estimation the author has fallen into the rut of giving too much attention to vessels and nerves of minor importance, and this at the expense of the greatly contracted chapters on the cranium, abdomen, and pelvis. Thus, in the region of the cranium, nothing is said of the exposure of the mastoid antrum

and the lateral sinus in relation to it, nor is there any text describing the exposure of the brain, its convolutions, or the method of bringing into view the Gasserian ganglion or branches of fifth nerve at the base of the skull. In like manner the thorax is summarily dismissed by a mere consideration of how to ligate the internal mammary artery. Other omissions noted by us are directions for gaining access to œsophagus, rectum, and prostate. The anatomy of perineum is also found wanting.

In whatever slight degree these omissions may detract from the usefulness of this otherwise originally treated volume, the author is to be congratulated upon the renewed interest in anatomy that the student and practising surgeon will find upon the perusal of his work.

MARTIN W. WARE.

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